PRODUCING FRESH WINTER VEGETABLES IN FLORIDA AND MEXICO:
Costs and Competition

G. A. Zepp
R. L. Simmons

U.S. Department of Agriculture
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Mexico and Florida supply most of the fresh winter vegetables for the U.S. market. Florida's share of the market declined between 1968 and 1978, but recovered partially from 1973 through 1976. Florida tomato growers enjoy a net competitive advantage over Mexican growers. Mexican growers have a net advantage in producing and marketing green peppers and cucumbers. Any advantage in eggplant production is unclear. Florida may continue to strengthen its general competitive position because Mexico's higher internal rate of inflation keeps pushing up its production costs faster.

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SUMMARY

Mexican growers can produce fresh tomatoes, green peppers, cucumbers, and eggplants more cheaply than Florida growers. But export fees to the United States cause Mexico's total costs to exceed Florida's for all four vegetables.

For example, the total cost of growing, harvesting, packing, and selling Mexican tomatoes in the 1978/79 season was $4.39 per 30-pound package versus $5.74 in Dade County, Fla., and $5.59 in southwest Florida. However, tomatoes from Mexico had an additional $1.36 in costs for delivery to and crossing the U.S. border, giving a total cost of $5.75 per package delivered to Nogales, Ariz.--slightly higher than the total Florida cost. The pattern for the other vegetables looks much the same--Mexico's costs at the packinghouse are lower, but Florida has the total cost advantage when export costs for vegetables from Mexico are added.

Mexico's costs of production have been rising faster than Florida's since 1974, thus strengthening Florida's competitive position. Florida's position improved greatly from 1973 through 1976, despite Mexico's 1976 devaluation of the peso which lowered the peso's value about 82 percent relative to the U.S. dollar. A severe freeze in 1977 temporarily slowed the pace of Florida's recovery. Florida's competitive position in cucumber and eggplant production deteriorated slightly due mainly to the effects of the peso devaluation. Florida will probably continue to strengthen its cost competitive position because of Mexico's higher rate of inflation.

The prices received by growers also affect an area's competitive position. Florida producers enjoy an advantage of $0.17 to $0.30 per 30-pound carton of tomatoes over what Mexican tomatoes sell for at Nogales, Ariz. Mexican producers tend to receive the higher average price for peppers and cucumbers. For eggplant, incomplete data suggest that Mexico also may enjoy a slight price advantage over Florida.

Florida has a net competitive advantage (total of the cost advantage plus the price advantage) in tomato production. The estimated net competitive advantage (per 30-pound carton) in the 1978/79 season was $0.33 for tomatoes grown in southwest Florida, $0.18 for Dade County production, and $0.98 for tomatoes produced in the Manatee-Ruskin area. Mexico enjoys a net advantage in green peppers, due mainly to a more favorable winter climate.

Florida enjoys a net competitive advantage for cucumbers during the fall and in the spring, while Mexico has the net advantage in the winter--due largely to its more favorable climate for cucumber production during that period. Florida's fall and spring climates are best suited to cucumber production, while Mexican producers face quality problems during the hot weather.

Although Florida has a slight cost advantage in eggplant production, Mexico, due to its large volume of shipments during high price periods, may have a price advantage which is more than offsetting.

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This report presents Mexico's crop area and yield in metric units. Use the following conversion factors to convert to standard U.S. measures:

Hectare = 2.471 acres.
Metric ton = 2,204.62 pounds.

CONTENTS

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Producing Fresh Winter Vegetables in Florida and Mexico:

Costs and Competition

G. A. Zepp

R. L. Simmons 1/

INTRODUCTION

Florida and the State of Sinaloa, Mexico, supply most of the fresh vegetables to the U.S. market during the cool season. California, Texas, and several other lesser supply areas produce late in the fall and again early in the spring. Southern Florida, however, is the principal domestic supplier from January through April. Vegetables exported from Mexico have become an increasingly important source of supply for the United States, and Mexico's shipments have occasionally exceeded Florida's (table 1).

This study assesses changes occurring in the competitive positions of Florida and Mexico between 1974 and 1979. Specific objectives are: to estimate the costs to produce and market fresh tomatoes, cucumbers, peppers, and eggplant from west Mexico and Florida; to assess the effects of price inflation for inputs and the devaluation of the peso on the competitive positions of Florida and Mexico; and to assess overall changes in the competitive positions of the two areas in supplying winter fresh vegetables to the U.S. market.

A supply region's competitive position is enhanced (1) when its total cost of production and marketing is lower relative to a competing region's costs, (2) when its average price received for its product is higher relative to a competing region's prices, or (3) both. In this study, the effects of both of these factors--production costs and prices received--were estimated to determine the competitive advantage of each area for each vegetable. Summation of an area's cost and price advantages provides a measure of its net competitive advantage.

Vegetable growers in Florida and Mexico face numerous regulations which can enhance or inhibit the competitive advantages of each area. Some of the regulations that affect Florida vegetable production costs include: (1) minimum wage requirements for U.S. agricultural labor, (2) U.S. Occupational Safety and Health Administration regulations affecting field and packinghouse workers, (3) U.S. Environmental Protection Agency regulations affecting availability and use of pesticides, (4) State and local environmental regulations pertaining to water and air quality, and (5) U.S. Department of Agriculture marketing regulations pertaining to product quality.

Mexican producers face somewhat different regulations in their country, but in addition, Mexican vegetables must conform to U.S. marketing regulations and pesticide tolerance requirements when exported here.

1/ Zepp is an agricultural economist with the National Economics Division, Economics, Statistics, and Cooperatives Service, stationed at Gainesville, Fla. Simmons is a professor of Economics and Business, North Carolina State University, Raleigh.

Table 1--Total recorded movement of fresh winter vegetables from Florida and Mexico 1/

Season	Tomatoes 2/		Bell peppers 3/		Cucumbers 3/		Eggplant 3/	
	Florida	Mexico	Florida	Mexico	Florida	Mexico	Florida	Mexico
	Million pounds							
1967/68	663	402	157	22	220	58	24	9
1968/69	552	548	141	37	165	113	24	17
1969/70	417	710	73	55	153	129	18	23
1970/71	533	645	96	98	134	190	23	24
1971/72	589	641	120	79	178	164	26	29
1972/73	598	819	143	96	172	178	25	40
1973/74	599	664	138	110	160	181	30	34
1974/75	704	620	175	70	200	113	40	28
1975/76	758	671	158	75	223	187	39	33
1976/77	622	828	157	95	218	215	40	34
1977/78	722	855	177	149	233	255	41	43

1/ Data for Mexico show total recorded movement for all points of entry to the United States, including some vegetables transshipped across the United States to Canada.
2/ Total for October through July reported in [12].
3/ Total for October through June.

Sources: [9, 12].

We do not try, in this report, to describe completely all regulations affecting the winter vegetable industries in Florida and Mexico, nor assess their effects on competitive positions. Only the regulations governing supplies of vegetables are reported here, and they are described under the individual commodity sections of the section titled "Production Practices and Costs," beginning on page 12.

Competition between Florida and Mexico in supplying winter produce was first examined by Fliginger et al. in 1968 [10]. 2/ At that time, western Mexico had lower costs for growing and harvesting tomatoes, while Florida had lower marketing costs. The total cost for tomatoes delivered to Chicago from the two areas was about even. The authors concluded that: Mexico would continue to increase its exports of vine-ripe tomatoes to the United States, while Florida's production of vine-ripe tomatoes during the winter months would decline; Florida would retain a stronger competitive position for mature green tomatoes than for vine-ripes; Mexico would increase its shipments of peppers and eggplant to the Western United States with Florida remaining in a strong competitive position in the central and eastern U.S. markets; and Florida offered little competition to cucumber imports during the cold winter months.

2/ Underscored numbers in brackets refer to sources listed at the back of the report, beginning on page 51.

The same authors, in a 1971 supplement to the above study, updated the cost estimates and compared them with the 1968 findings. Costs of producing and marketing tomatoes rose in both Florida and Mexico, but more in Florida, thereby strengthening the cost advantage held by Mexico in 1967/68. The authors concluded that Mexico would continue to supply larger amounts of vine-ripe tomatoes in the United States and that Florida's relative position would continue to decline. They further concluded that imports of Mexican cucumbers and peppers would continue to make inroads into Florida's share of the winter market.

An additional study in 1973/74 concluded that, although western Mexico held a slight total cost advantage in tomatoes, even with the import tariff, the advantage had narrowed somewhat since 1971, indicating a possible strengthening of Florida's share of the U.S. market [15]. Mexico continued, however, to maintain the competitive advantage during the winter, due to its milder climate.

Several factors since 1974 could affect the competitive positions of the Florida and Mexican winter vegetable industries. The exchange rate between the Mexican peso and the U.S. dollar changed in August 1976 from 12.5 pesos to the dollar to a floating rate, which had stabilized between 20 and 25 pesos to the dollar as of August 1979. In addition, different rates of input price inflation and technological change may have altered the relative costs of producing and marketing fresh vegetables from Florida and Mexico.

TRENDS IN PRODUCTION

Tables 1 and 2 compare changes in the volume of shipments from Mexico and Florida as one way of assessing changes in their competitive positions.

The combined total shipments from Mexico and Florida increased substantially over the past 10 years, with increased volumes of shipments from Mexico accounting for most of the increase. Florida's shipments increased rather modestly during the same period, and its share of the combined total decreased. Mexico's greatest volume increase was in tomato exports, rising from 402 million pounds in the 1967/68 season to 855 million in 1977/78, a 453-million-pound increase. Florida shipments during the same period increased by 59 million pounds from 663 million in 1967/68 to 722 million in 1977/78.

Mexico's advances for the other vegetables summarized in table 1 were almost as dramatic, while the Florida story was much the same as that for tomatoes. Mexican pepper shipments increased by 127 million pounds from 22 million to 149 million between 1967/68 and 1977/78, while Florida's production increased by 20 million pounds from 157 million to 177 million. A similar pattern was observed for cucumber and eggplant, with Mexican advances of 197 million pounds and 34 million pounds, respectively, while the corresponding Florida advances were 13 million pounds and 17 million pounds.

Comparing changes over a period of time such as 1967/68 through 1977/78 indicates long-term trends, but hides short-term changes which may have important implications. Closer examination of tables 1 and 2 indicates three distinct periods showing different trends for the Florida and Mexican industries: (1) 1967/68 to 1972/73, (2) 1972/73 to 1975/76, and (3) 1975/76 to 1977/78.

The 1967/68 to 1972/73 period was one of major gains for Mexico and losses for Florida. Mexico expanded its exports of all four vegetables. Florida shipments, in contrast, declined for all vegetables except eggplant, which showed a modest 1-million-pound gain.

Table 2--Change in total recorded movement of fresh winter vegetables from Florida and Mexico, between selected seasons

Season	Tomatoes		Bell peppers		Cucumbers		Eggplant	
	Florida	Mexico	Florida	Mexico	Florida	Mexico	Florida	Mexico
	Million pounds							
1967/68 to 1977/78	59	453	20	127	13	197	17	34
1967/68 to 1972/73	-65	417	-14	74	-48	120	1	31
1972/73 to 1975/76	160	-148	15	-21	51	9	14	-7
1975/76 to 1977/78	-36	184	19	74	10	68	2	10

Source: calculated from table 1.

The three seasons following 1972/73 constituted generally a period of contraction for Mexico and expansion for Florida. Mexican tomato exports fell from 819 million pounds in 1972/73 to 620 million pounds two seasons later. Florida tomato shipments, meanwhile, continued their upward trend, which had started in the 1969/70 season, reaching a high of 758 million pounds by 1975/76. Although there were year-to-year variations in shipments of other vegetables, the trend in Florida shipments was upward, while Mexican exports tended to be level or to decline. Mexico's exports of peppers and eggplant decreased over the 3-year period, while its exports of cucumbers increased at rather modest rates.

Two major events--one economic and one climatic--in the 1976/77 season appear to have ended Florida's resurgence and Mexico's export contraction. The economic event was devaluation of the Mexican peso, which lowered its value relative to the U.S. dollar, thereby tending to reduce Mexico's costs relative to costs for U.S. growers. West Mexican acreage of important export vegetables was expanded immediately following the devaluation (see tables 14, 20, 25, and 29, in the following sections). However, subsequent input price inflation in Mexico tended to offset some of the advantage realized by devaluation, and the Mexican acreage of export vegetables leveled off or declined slightly in the two seasons after 1976/77.

The climatic event that adversely affected the Florida industry was a disastrous freeze in January 1977, which destroyed nearly all of Florida's winter vegetables. Mexico was the sole supplier to the U.S. market for nearly 3 months following the freeze. Consequently, Florida shipments of all four vegetables declined during the 1976/77 season, while Mexican shipments increased. Florida tomato shipments fell by 136 million pounds from the previous season, whereas Mexico's rose by 157 million pounds. The effect of shipments of other vegetables was similar, although less dramatic. The 1977/78 season was one of recouping market shares for the Florida industry. Florida shipments of all four vegetables returned to near 1975/76 season levels, even though Mexican shipments continued at a high level.

The third period, starting with the season following 1975/76 may represent a continuation of the pre-1972/73 trend. Mexican shipments of all commodities rebounded, and record high volumes were recorded for all imported vegetables during the 1977/78 season. The important difference from the 1967/68 to 1972/73 trend was that Florida's shipments also remained strong following 1975/76. It is not clear at this time (August 1979) if Mexico will continue its strong expansion of the past two seasons or whether a status quo has been reached where Florida and Mexico will maintain more or less constant shares of the market. Shipments as of June 30, 1979, indicate that Mexico's shipments of tomatoes, peppers, and eggplant were running behind the previous season's volumes, due partly to adverse weather in Sinaloa [4]. Florida's current season shipments of cucumbers, eggplant, and tomatoes were ahead of the previous season's shipments for the same date, while current season shipments of peppers were behind last season's.

CHANGING MARKET SHARES

Florida's and Mexico's market shares for tomatoes, peppers, cucumbers, and eggplant were computed from unload data compiled by the U.S. Department of Agriculture [2]. 3/ Examination of monthly shares for a typical year indicates that Mexico supplies the major portion of the fresh vegetables to the United States during January, February, and March, and for tomatoes, Mexican supplies continue heavy through April (table 3). Florida supplies large volumes each month, but accounts for more than 50 percent of total supplies only during November, December, April, and May. Only during May is Florida the major supplier for all four vegetables considered in this report. Other areas (California, Texas, North Carolina, South Carolina, and other Southern States) supply large quantities of fresh vegetables during November and June.

Although both Florida and Mexico ship produce to all regions in most months, Florida tends to be the major supplier to the Northeast and Southeast; Mexico is strongest in the West. The Midwest tends to be more equally shared, and is the area where the greatest share adjustment occurs as Florida and Mexico switch roles during the season as the dominant supplier.

Market shares were examined for three different monthly periods for each of the four vegetables (tables 4 to 7). The shares during the November-June period indicate the relative importance of Florida and Mexico over the entire season. The shares from December to April indicate relative importance during the period when the bulk of Florida shipments originate from the southernmost areas, and the most intense competition exists between Florida and Mexico. The May-June shares indicate the relative importance of the two areas when Florida's spring crop is in full swing and Mexican shipments to the United States are tapering off.

The relative market shares for the November-June and December-April periods present a picture of competition very similar to that shown by analysis of shipments. Mexico accounted for increasingly larger shares of the market for all four vegetables from 1965/66 through 1972/73. This period of Mexican expansion was followed by 3 years of gains by the Florida industry. Florida's relative share expanded, or at least remained constant, from the 1973/74 through the 1975/76 seasons. Then during the 1976/77 season, Florida's market shares fell sharply and Mexico's rose, due mainly to the disastrous January freeze in Florida. The 1977/78 season appeared to be a period of recovery for Florida, but Mexico's exports remained high, and therefore

3/ Unload data are not ideal for this comparison, since recorded unloads represent only about 50 percent of total shipments. Nevertheless, the data probably represent reasonably well the important elements of change in total volume.

Table 3--Florida's and Mexico's shares of the U.S. market for selected fresh vegetables by month, 1975/76 1/

Commodity and region	November		December		January		February		March		April		May		June	
	Fla.	Mex.	Fla.	Mex.	Fla.	Mex.	Fla.	Mex.	Fla.	Mex.	Fla.	Mex.	Fla.	Mex.	Fla.	Mex.
	Percent															
Tomatoes:																
Northeast	62	2	89	4	81	17	71	28	72	27	75	22	90	6	27	4
Southeast	67	4	84	10	80	19	67	33	72	28	68	32	94	5	23	3
Midwest	26	5	58	13	50	47	31	69	33	65	35	59	66	23	20	10
West	3	4	12	23	8	81	5	95	6	94	9	91	28	68	5	36
United States	32	4	52	14	47	47	37	62	39	61	43	54	66	29	18	15
Cucumbers:																
Northeast	90	3	56	40	26	72	8	88	17	72	92	6	96	1	36	0
Southeast	77	0	80	12	32	58	19	79	28	66	90	9	88	1	41	0
Midwest	65	5	50	40	25	75	12	86	19	76	77	19	84	2	40	0
West	3	8	3	76	1	97	0	96	0	94	16	61	10	8	3	1
United States	61	4	45	46	20	77	8	89	14	78	74	19	83	3	30	0
Peppers:																
Northeast	40	0	77	5	77	21	68	32	79	19	95	2	91	0	54	0
Southeast	28	0	77	3	76	22	69	31	80	20	97	3	94	0	52	0
Midwest	27	2	58	13	45	48	29	71	45	55	84	16	79	2	28	0
West	1	9	5	50	4	93	3	97	5	95	23	77	23	22	3	5
United States	23	3	53	18	52	44	42	58	52	48	76	23	72	6	35	1
Eggplant:																
Northeast	84	13	62	38	48	52	32	67	32	67	78	21	90	9	94	1
Southeast	90	0	78	16	73	27	64	36	52	48	84	16	91	9	68	9
Midwest	72	13	62	36	52	48	37	63	28	72	72	28	90	10	86	0
West	5	32	4	90	1	99	2	98	1	99	2	98	3	94	5	25
United States	61	17	49	48	40	60	29	71	26	74	58	42	69	30	68	7

1/ Cities' data were grouped into four geographical areas as follows: Northeast: Albany, Baltimore, Boston, Buffalo, New York City, Philadelphia, Pittsburgh, Providence, and Washington, D.C.; Southeast: Atlanta, Birmingham, Columbia, Memphis, Miami, Nashville, and New Orleans; Midwest: Chicago, Cincinnati, Cleveland, Detroit, Indianapolis, Kansas City, St. Louis, Milwaukee, Minneapolis, and Louisville; West: Dallas, Ft. Worth, Denver, Houston, Los Angeles, Oklahoma City, Portland, Salt Lake City, San Antonio, San Francisco, and Seattle.

Source: Calculated from [2].

Table 4--Tomatoes: relative U.S. market shares for Florida and Mexico 1/

Season	November-June		December-April		May-June	
	Florida	Mexico	Florida	Mexico	Florida	Mexico
	Percent					
1965/66	66.7	33.3	59.2	40.8	81.6	18.4
1966/67	63.6	36.4	60.0	40.0	70.2	29.8
1967/68	64.2	35.8	59.6	40.4	69.1	30.9
1968/69	55.6	44.4	50.8	49.2	66.0	34.0
1969/70	41.4	58.6	32.1	67.9	61.3	38.7
1970/71	50.8	49.2	43.3	56.7	64.1	35.9
1971/72	54.5	45.5	50.1	49.9	63.3	36.7
1972/73	48.4	51.6	40.8	59.2	59.7	40.3
1973/74	51.0	49.0	46.1	53.9	58.3	41.7
1974/75	59.0	41.0	60.6	39.4	53.0	47.0
1975/76	54.4	45.6	40.7	59.3	65.8	34.2
1976/77	43.9	56.1	30.1	69.9	64.3	35.7
1977/78	47.9	52.1	36.7	63.3	66.7	33.3
1978/79 2/	59.3	40.7	49.6	50.4	72.9	27.1

1/ Relative U.S. market shares were calculated as each area's percentage share of the Florida-Mexico combined total.
2/ Preliminary, based on [4].

Source: [2].

Table 5--Green peppers: relative U.S. market shares for Florida and Mexico 1/

Season	November-June		December-April		May-June	
	Florida	Mexico	Florida	Mexico	Florida	Mexico
	Percent					
1965/66	84.5	14.6	78.6	21.4	98.1	1.9
1966/67	85.3	14.7	80.6	19.4	97.0	3.0
1967/68	88.2	11.8	85.1	14.9	96.5	3.5
1968/69	79.8	20.2	73.5	26.5	96.2	3.8
1969/70	57.9	42.1	45.7	54.3	84.9	15.1
1970/71	59.3	40.7	49.2	50.8	86.4	13.6
1971/72	67.6	32.4	61.0	39.0	87.6	12.4
1972/73	66.0	34.0	54.2	45.8	90.0	10.0
1973/74	64.4	35.6	57.7	42.3	87.8	12.2
1974/75	79.3	20.7	75.7	24.3	89.7	10.3
1975/76	69.1	30.9	59.6	40.4	93.8	6.2
1976/77	60.6	39.4	45.6	54.4	88.2	11.8
1977/78	61.7	38.3	49.2	50.8	91.7	8.3
1978/79 2/	61.4	38.6	52.8	47.2	72.9	27.1

1/ Relative U.S. market shares were calculated as each area's percentage share of the Florida-Mexico combined total.
2/ Preliminary, based on [4].

Source: [2].

Table 6--Cucumbers: relative U.S. market shares for Florida and Mexico 1/

Season	November-June		December-April		May-June	
	Florida	Mexico	Florida	Mexico	Florida	Mexico
	Percent					
1965/66	82.1	17.9	70.1	29.9	98.1	1.9
1966/67	74.5	25.5	60.6	39.4	99.4	0.6
1967/68	79.8	20.2	66.1	33.9	99.5	0.5
1968/69	64.3	35.7	45.2	54.8	98.6	1.4
1969/70	59.8	40.2	32.0	68.0	97.7	2.3
1970/71	51.0	49.0	21.3	78.7	95.0	5.0
1971/72	56.9	43.1	33.9	66.1	95.1	4.9
1972/73	54.8	45.2	29.4	70.6	95.2	4.8
1973/74	53.9	46.1	32.9	67.1	94.6	5.4
1974/75	69.4	30.6	53.3	46.7	91.5	8.5
1975/76	59.7	40.3	40.4	59.6	97.6	2.4
1976/77	52.8	47.2	31.3	68.7	94.6	5.4
1977/78	47.9	52.1	21.0	79.0	94.5	5.5
1978/79 2/	50.0	50.0	27.5	72.5	91.8	8.2

1/ Relative U.S. market shares were calculated as each area's percentage share of the Florida-Mexico combined total.
2/ Preliminary, based on [4].

Source: [2].

Table 7--Eggplant: relative U.S. market share for Florida and Mexico 1/

Season	November-June		December-April		May-June	
	Florida	Mexico	Florida	Mexico	Florida	Mexico
	Percent					
1965/66	82.2	17.8	76.9	23.1	90.9	9.1
1966/67	82.0	18.0	77.9	22.1	86.0	14.0
1967/68	72.1	27.9	64.0	36.0	80.5	19.5
1968/69	62.1	37.9	52.1	47.9	78.8	21.2
1969/70	46.6	53.4	32.3	67.7	82.1	17.9
1970/71	47.7	52.3	36.4	63.6	65.6	34.4
1971/72	50.5	49.5	40.3	59.7	72.5	27.5
1972/73	43.5	56.5	30.3	69.7	65.1	34.9
1973/74	47.5	52.5	34.9	65.1	76.1	23.9
1974/75	60.6	39.4	50.5	49.5	78.2	21.8
1975/76	52.8	47.2	41.3	58.7	78.8	21.2
1976/77	48.0	52.0	30.9	69.1	78.6	21.4
1977/78	45.3	54.7	29.1	70.9	67.2	32.8
1978/79 2/	49.2	50.8	40.6	59.4	55.9	44.1

1/ Relative U.S. market shares were calculated as each area's percentage share of the Florida-Mexico combined total.
2/ Preliminary, based on [4].

Source: [2].

Florida's market shares did not increase to previous levels. Preliminary data for 1978/79, however, indicate that Florida is having a good year and that its market shares have returned to pre-1976/77 levels.

Only during the May to June period does a different pattern of market shares exist. Florida's May to June shares declined almost continuously from 1965/66 through 1974/75, and have leveled off or increased since that time. Florida's share of eggplant reached its low during the 1972/73 season.

Shipments and unloads data indicate that Mexico has, over the past 10 years, made major inroads in the U.S. fresh winter vegetable market with most of the gains occurring in the early part of that period. The last 8 years show conflicting tendencies with no clear trend, and leave unclear whether shipments and unloads will resume former trends. Changes in production techniques, input prices, trade policies, and other factors could change the competitive advantage of one area or the other, resulting in a different trend. The remainder of this report is devoted to assessing factors that affect the current competitive advantage of Florida and Mexico in supplying fresh winter vegetables.

INPUT PRICES

Input price changes in Florida and Mexico affect costs directly. This section discusses changes in input prices for Florida and Mexico between 1968 and 1978 and includes a discussion on the effects of the August 1976 peso devaluation on Mexico's cost competitive position.

Wages

Labor is the largest cost component in vegetable production in both Florida and Mexico. Wage rates are an important indicator of changes in labor costs.

The rural wage in Mexico increased substantially between the 1967/68 and 1978/79 seasons (table 8). From $1.82 per day in 1967/68, the Mexican wage rose to $5.60 per day during the 1975/76 season. The 1976 devaluation of the peso temporarily lowered the dollar value of the rural wage of Mexico, but political pressures arose to increase wage levels after the devaluation. The peso value of the rural wage increased 36 percent in the season following devaluation, and another 16 percent the following year. By 1978/79, the dollar value of the Mexican wage had risen to its pre-devaluation level.

The Mexican wage has risen faster than Florida's (table 9). Between the 1973/74 and 1978/79 seasons, Mexican wages rose about 47 percent in dollar terms compared to a 45-percent increase for Florida. 4/ Mexican producers still have a labor cost advantage. Mexican wage rates started from a very low level and in 1978 were only about one-fifth the Florida rate.

4/ The difference between the dollar-value and the peso-value indices is due to the devaluation of the peso in 1976. The dollar-value index appears more appropriate for the purpose of comparing price changes in Mexico relative to price changes in Florida.

Table 8--Wages paid for agricultural labor in Florida and Mexico

Season	Florida hourly wage, January 1/		Florida daily wage, January 2/		Mexico daily wage	
	Old series	New series	Old series	New series		
	Dollars				Pesos	Dollars
1967/68	1.19	NA	9.52	NA	22.75	1.82
1968/69	1.42	NA	11.36	NA	26.50	2.12
1969/70	1.51	NA	12.08	NA	30.50	2.44
1970/71	1.50	NA	12.00	NA	30.50	2.44
1971/72	1.40	NA	11.20	NA	36.00	2.85
1972/73	1.70	NA	13.60	NA	36.00	2.85
1973/74	1.85	2.32	14.80	18.56	47.90	3.83
1974/75	2.06	2.57	16.48	20.56	58.45	4.67
1975/76	NA	2.83	NA	22.64	70.00	5.60
1976/77	NA	2.92	NA	23.36	95.00	4.16
1977/78	NA	3.22	NA	25.76	110.00	4.82
1978/79	NA	3.36	NA	26.88	129.00	5.65

NA = Not applicable.

1/ The USDA changed its method of estimating agricultural wages beginning in 1974. Old series estimates were based on data reported monthly by cooperating farm employers. New series wages are based on quarterly probability surveys of agricultural employers.

2/ Calculated as (8 hours) x (Florida hourly wage).

Sources: Florida wage data are from USDA [16]. Mexican wages are from [8].

Table 9--Indices of input prices for Florida and Mexico

Input	Florida			Mexico			
	1970	1974	1978	1970	1974	1978 (peso value)	1978 1/ (dollar value)
	Index (1968=100)						
Wages	126	156	216	134	210	484	265
Fertilizer	94	178	191	81	98	183	100
Machinery	112	154	252	106	142	367	201
Pesticides	117	158	2/310	--	3/100	190	104
Cartons	107	159	4/196	100	154	294	161
Transportation	--	--	--	108	130	294	161
Composite of all 5/	117	157	229	--	161	362	195

-- = Data not available.

1/ The 1978 dollar value index is related to the 1978 peso value index by the ratio of the old exchange rate (12.5) to the new exchange rate (22.84) [that is, dollar value index = (12.5 ÷ 22.84) x peso value index]. The dollar value and peso value index were equal in 1970 and 1974.

2/ 1977 index was the last year available.

3/ 1975 was the first year available.

4/ 1977/78 season was the last year available.

5/ The weighting factors were as follows: Florida: wages--48 percent, fertilizer--7 percent, machinery--16 percent, pesticides--13 percent, and cartons--16 percent; Mexico: wages--40 percent, fertilizer--8 percent, machinery--2 percent, pesticides--5 percent, cartons--28 percent, and transportation--17 percent. The weighting factors were based on the relative importance of each item in the cost of producing tomatoes in 1978/79.

Sources: Florida--wage index calculated from [16], fertilizer and machinery indices from [18],pesticide index from [5] and unpublished data, and carton costs from [7]; Mexican indices calculated from [8].

Fertilizer

Fertilizer prices in the United States have risen faster than the dollar value fertilizer prices in Mexico. The U.S. index of fertilizer prices rose from 100 to 191 between 1968 and 1978, while the comparable Mexican index remained at 100 (in dollar terms). Some of Mexico's fertilizer materials are produced domestically and some are imported. The Government-set Mexican fertilizer prices do not necessarily reflect the cost of imported fertilizer materials. Therefore the higher costs of imported fertilizer, due to devaluation, may not be reflected in the Government-administered price.

Machinery

Machinery costs increased faster in Florida during the last 4 years than in Mexico: the Mexican index increased from 142 to 201, a 41-percent rise, while the U.S. index rose to 252 from 154, a 63-percent rise. Most tractors, implements, and packing plant machinery used in Mexico are assembled in Mexico by foreign subsidiaries of U.S. firms. Some used machinery is imported from the United States, but a tariff on new equipment limits imports of new machinery.

Pesticides

U.S. pesticide prices (primarily insecticides and fungicides) experienced the greatest price increase of all input categories, nearly doubling during the 1974 to 1978 period (table 9). Mexican pesticide prices increased by about 90 percent from 1975 to 1979 in peso terms, but the devaluation kept the increase in dollar terms quite small. Mexico produces practically all of its own pesticides, and its prices bear little relation to U.S. prices.

Cartons

The cost of cartons, the major cost item in packing vegetables, has risen in both Florida and Mexico. Although carton costs increased more in Florida over the past four seasons than the dollar value of Mexico's increase, the Mexican price for cartons remains higher than the Florida price. A 20-pound tomato carton in Mexico, at the beginning of the 1978/79 season, cost $0.66 and a 30-pound carton cost $0.75. In Florida, 30-pound cartons cost about $0.60 each during the 1978/79 season.

Transportation

Mexican growers must pay for transportation to the U.S. border, a major added cost not incurred by Florida producers. Mexican vegetables must be hauled nearly 600 miles by truck or rail from Culiacan, State of Sinaloa, to Nogales, Ariz., the major port of entry for Mexican vegetables. Truckers charged 16,500 pesos ($722) per load for this trip during January 1979, an increase of 36 percent over 1973/74 rates.

Effects of Devaluation

The Mexican Government abandoned its fixed currency exchange rate with the United States on August 30, 1976. Since then, the value of the peso has declined from 12.5 to the dollar to 22.84 to the dollar, a devaluation of about 82.7 percent.

Devaluation of a country's currency normally aids export industries by lowering production costs in the exporting country relative to its foreign competitors. Hence, devaluation of the peso relative to the dollar should have lowered Mexico's production costs, in dollar terms, relative to those in Florida. Subsequent inflation, however, soon offset much of the reduction in Mexico's production costs. Costs of fertilizer, machine services, transportation services, and cartons rapidly increased following the devaluation. Political pressures also built up to raise the rural wage level and alleviate the drop in real income due to the devaluation. 5/

Examining price indices for 1974, a pre-devaluation date, and 1978, a post-devaluation date, provides an assessment of the net effects of the devaluation, and subsequent input price inflation (table 9). Price indices in dollar terms for all input categories increased faster for Florida than for Mexico. The U.S. weighted average index, or composite index, for all categories increased by 46 percent, from 157 to 229, a 10-percent annual rate of increase. In contrast, the composite index for Mexico increased by only about 23 percent, from 161 to 195, a 5-percent annual rate of net increase.

Assessing the effects of devaluation also requires examining any changes in the value of byproducts. In the case of joint products, revenue from the byproduct (tomatoes sold in Mexico) offsets a portion of the cost of the principal product (tomatoes exported to the United States). Mexican growers sell the smaller and the riper fruit on the home market, and export the larger, higher value fruit.

Home market sales help to offset some of the costs for growing Mexican export tomatoes. Domestic sales account for about 35 percent of the total Mexican volume. Prices of tomatoes on the Mexican domestic market increased by only about 45 percent in the 2 years following August 1976, compared with the 83-percent increase in the value of export tomatoes due to the devaluation. Therefore, Mexican domestic sales offset a smaller portion of growing costs currently than they did prior to the devaluation. As a result, export tomatoes must now carry a greater share of the growing cost than in 1973/74, tending to offset somewhat any advantage gained from the devaluation. This joint-product effect relates principally to tomato production, as Mexican domestic sales of other export vegetables account for a very small portion of total sales values.

PRODUCTION PRACTICES AND COSTS

In addition to relative changes in input costs paid by Florida and Mexican vegetable growers, changes in production technology (production practices and yields) may have affected the competitive advantage of the two areas. These changes are examined in this section. Estimates of total costs for growing, harvesting, and packing vegetables in Florida and Mexico follow these discussions on technological change. Cost estimates were developed in such a way as to be compatible in comparing total costs for the two areas (see appendix A for a description of how the costs were estimated and the working budgets used to develop the cost estimates). The Florida costs given are those estimated f.o.b. (free on board) the Florida shipping point, and Mexican costs are for vegetables f.o.b. Nogales, Ariz., with duties and crossing charges paid.

5/ Real income declined because a large share of consumer goods in the Culiacan area are imported, and rose in price almost in direct proportion to the amount of devaluation.

Tomatoes in Florida

Tomatoes are grown in several areas of Florida, the principal ones being (1) the Manatee-Ruskin area, which lies south and east of Tampa in west central Florida, (2) the Fort Pierce-Pompano Beach area, which stretches along the east coast between these two cities, (3) the Immokalee-Naples area in southwest Florida, and (4) the Dade area centered around Homestead in Dade County (figure 1). Harvesting begins in October and November in the central areas of the State and moves south with the approach of winter. In midwinter, production is concentrated in Dade County and in the Immokalee-Naples area. With the onset of warmer spring weather, production returns to the central areas.

Area, Yield, Production, and Value

The total area planted to tomatoes in Florida decreased over the past 10 seasons, but total production increased, because of increasing yields (table 10). Yield per acre for the last 5 years averaged 737 30-pound cartons, an increase of 65 percent over the 447-carton average yield for the previous 5 years. Several factors contributed to the yield increases. One was the widespread adoption of full-bed plastic mulch in growing tomatoes--a major yield-increasing practice. Decreasing tomato acreage in the low-yield ground tomato area and increasing acreage in the high-yield stake tomato areas also raised the State's average yield. Acreage has declined in the low-yield areas of Fort Pierce and Dade County, while acreage has increased in the high-yield stake tomato areas of Immokalee-Naples and Manatee-Ruskin.

The dollar value of the Florida tomato crop doubled between the 1967/68 and 1977/78 seasons. However, deflating the 1977/78 crop value by the consumer price index for 1977 (181.5) to adjust for inflation gives a figure of $99 million, a rather modest increase over the $90 million value of the 1967/68 season.

Table 10--Florida fresh market tomato acreage, yield, production, and value

Crop year	Acreage		Yield per acre	Production	Value per carton	Value
	Planted	Harvested				
	------Acres---------		Cartons	1,000 cartons	Dollars	1,000 dollars
1967/68	47,800	47,000	505	23,757	3.79	90,039
1968/69	49,100	47,500	430	20,410	3.97	81,028
1969/70	52,800	47,400	326	15,460	3.67	56,738
1970/71	43,000	40,700	478	19,437	4.01	77,942
1971/72	44,400	43,600	498	21,693	4.81	104,343
1972/73	46,700	45,800	504	23,097	4.83	111,559
1973/74	35,500	34,700	663	23,020	5.27	121,315
1974/75	31,700	31,500	855	26,930	5.48	147,576
1975/76	38,700	38,300	765	29,293	5.51	161,404
1976/77	43,200	34,000	712	24,210	6.36	153,976
1977/78	42,100	41,500	688	28,550	6.34	181,083

Source: [11].

Figure 1

Florida, USA:
Major Growing Areas for Fresh Winter Vegetables

Cultural Practices

Fresh tomatoes from Florida are marketed both as vine-ripe and mature green, although the latter predominates. Mature greens typically account for 80 to 90 percent of the Florida marketings.

Florida growers make widespread use of two cultural methods: stake culture and ground culture. In stake culture, tomato stalks are supported upright with stakes and string. Strings run parallel on both sides of the tomato plant and are fastened to stakes driven into the ground between each plant. Tomato plants are tied three or four different times during the season. The Manatee-Ruskin and the Immokalee-Naples areas are the principal mature green stake production areas. Ground tomatoes grow without the benefit of upright support. Dade County has the largest acreage of ground tomatoes.

The most prominent change in Florida's tomato production in the past 5 years has been the adoption of full-bed plastic mulch. The practice has caused a large additional preharvest cost (about $140 to $160 per acre for plastic cover), but substantially increased yields more than offset the added cost. Plastic mulch provides relative uniformity in soil moisture and temperature conditions in the root zone, which promotes superior plant growth. In addition, the mulch reduces fertilizer leaching and aids in weed control. Most Florida tomatoes now grow over plastic mulch.

Tomatoes grow in raised beds which are spaced about 6 feet apart. An exception to the 6-foot spacing occurs in the Manatee-Ruskin area where wide-row culture (up to 12½ feet between rows) is practiced. Plant spacing within the row varies from area to area. Ground tomatoes in Dade County are planted one or two plants to the hill at 1-foot intervals. In the Immokalee area, plant spacing tends to be near 18 inches. Plant spacing with the wide-row culture of the Manatee-Ruskin area may be as much as 30 to 36 inches.

Florida growers practice two methods of planting tomatoes depending on whether the plants are to be staked or not: stake culture tomatoes are transplanted into the field as seedlings, ground culture tomatoes usually are seeded with a plug-mix of vermiculite and peat. With plug-mix seeding, a mechanical planter places a mixture of seed and the plug-mix in the soil as the desired plant spacing. The seedlings are then thinned by hand to achieve the desired one or two plants per hill.

Water control consists of supplying irrigation water during drought as well as disposing of excess water following heavy rains. Seepage irrigation methods supply the plant with water pumped from wells located in or near the field. Seepage irrigation is similar to furrow irrigation used in the West, except that ditches are dug at intervals parallel to the rows. Water may be supplied to the seepage ditches from a perimeter ditch or from plastic pipe and tubing. Water then seeps horizontally from the lateral ditches. Overhead sprinkling is the chief means of irrigation in Dade County, although some growers there use drip irrigation. With this latter method water drips from porous plastic tubing placed near or in the plants root zone. Drip irrigation requires less water and water can be applied to plants more uniformly.

Disease control consists of a preventive program of spraying on a regular 4- to 6-day schedule (20 to 25 applications per season). Different growers may follow rather different programs, but a typical program consists of applying Maneb and copper, with Bravo and Benlate being substituted late in the season. Some growers apply streptomycin early in the season for bacterial spot control.

Insecticides usually are applied at the same time as fungicides. Some typical insecticides are Thiodan, Dipel, Lannate, and Monitor. Some growers participate in an integrated pest management program, whereby insecticides are applied only after damage appears to reach a critical economic level. In some cases, reduced insecticide usage has maintained adequate insect control.

Much of the Florida tomato production occurs on old land--that is, land that has grown tomatoes and other vegetables the previous season or during recent years. This practice represents a departure from the past practice of growing tomatoes primarily on land that had not been devoted to vegetables for a number of years. The use of old land reduces land preparation costs, but increases costs for pest control, as fumigation to control soil-borne pests and weeds is now required.

Tomato production in Florida requires a lot of labor compared to most crops. Growing uses up to 180 hours per acre; harvesting and packing requires additional labor. A detailed listing of cultural operations and labor, machinery, and material requirements is shown in appendix A.

Tomatoes are picked into field buckets and dumped into bulk pallets, holding about 1,000 pounds, for transport to the packing shed. Most pickers are paid on a piece-rate basis. The tomatoes are washed, sorted, graded, and packed into 30-pound cartons.

The number of times the tomatoes can be picked in a season depends on the condition of the crop and the market price of tomatoes. Staked plants usually are picked three to five times, while ground plants usually are picked twice. Growers will try to pick one or two extra times, if the vines have marketable fruit and tomato prices are high. However, fruit will be left on the vine and destroyed if the price does not cover picking and packing costs. When it is no longer profitable to market the tomatoes commercially, some growers may lease a field to U-pick operators who market the remainder of the crop in the field.

A salaried salesman employed by the packinghouse or a commission broker usually handles the selling. Most tomatoes are picked in the mature green stage and placed in a controlled-atmosphere ripening room to initiate uniform ripening before shipping. The buyer pays the costs for this operation.

Florida Tomato Marketing Order

A Federal marketing order that specifies grade, size, container, and inspection requirements regulates Florida tomato handlers. Provisions for the 1978/79 season (October 15, 1978 through June 16, 1979) were as follows [13]:

1. Grade--All shipments must be U.S. #3 or better.

2. Size--a) Tomatoes must be at least 2-3/32 inches in diameter. 6/

   b) Only tomatoes larger than 2-16/32 inches in diameter may be mixed in containers.

   c) Tomato size designations must be used on containers to identify the size of tomatoes.

3. Containers--

   a) Tomatoes must be packed in containers holding 20, 30, or 40 pounds net weight.

   b) Containers must be properly marked to show net weight and name and address of shipper.

   c) Cartons being reused must be marked USED BOX.

4. Inspection--Tomatoes must be officially inspected and certified.

In addition to the above, Federal regulations require that all tomatoes imported into the country during the period in which the Florida Tomato Marketing Order is effective are subject to the same minimum grade and size regulation.

Costs

Tomato production cost estimates were developed for three areas--Manatee-Ruskin staked tomatoes, Immokalee-Naples (southwest Florida) staked production, and Dade County ground tomatoes. All three estimates are for mature green tomatoes. Appendix A contains the detailed budgets.

Costs for Dade County ground tomatoes (table 11) and southwest Florida staked tomatoes (table 12) typify those for production from mid-December to May 1. Costs for the Manatee-Ruskin area (table 13) typify May and early June production. Although the Manatee-Ruskin area ships some tomatoes during the fall months, its largest volume of shipments occurs during May and June. Costs for this area, presented herein, are specific to the spring production.

Labor is the largest single preharvest cost item in staked tomato production, and is second only to pesticide costs for ground tomato production. Most of the harvest cost, too, is a labor expense as is a substantial part of the packing and marketing cost. Pesticides are the second largest preharvest expense. Carton costs are a major expense item for packing and marketing tomatoes.

6/ The minimum size regulation specified 2-4/32 inches at the beginning of the season. The regulation was changed, effective Dec. 15, 1978, to 2-3/32 inches, and continued at the smaller size throughout the remainder of the season.

Table 11--Costs for producing and marketing mature green ground tomatoes in Dade County, Florida, 1978/79 season 1/

Cost item	Cost
	Dollars/acre
Preharvest:	
Land rent	90.00
Machinery services	242.02
Labor	437.51
Fertilizer	190.00
Pesticides	578.35
Other purchased inputs	
Plastic	168.00
Seeds/plants	6.25
Other	46.45
Administrative costs	79.13
Interest on operating costs	65.12
Total preharvest	1,902.83
Yield per acre: 675 30-pound cartons	Dollars/30-lb carton
Total preharvest	2.82
Harvest:	
Picking	.79
Hauling	.13
Total harvest	.92
Packing and marketing:	
Labor	.48
Machinery	.39
Pallets	.21
Boxes	.60
Other purchased supplies	.07
Administrative costs	.10
Selling costs	.15
Total packing and marketing	2.00
Total costs	5.74

1/ The budget showing details for individual cost items is presented in appendix A.

Table 12--Costs for producing and marketing mature green staked tomatoes in southwest Florida, 1978/79 season 1/

Cost item	Cost
	Dollars/acre
Preharvest:	
Land rent	42.50
Machine services	361.08
Labor	725.61
Fertilizer	234.75
Pesticides	560.50
Other purchased inputs	
Plastic	180.00
Seed/plants	162.00
Other	237.85
Administrative costs	112.70
Interest on operating capital	93.21
Total preharvest	2,710.20
Yield per acre: 950 30-pound cartons	Dollars/30-lb carton
Total preharvest	2.85
Harvest:	
Picking	.78
Hauling	.11
Total harvest	.89
Packing and marketing:	
Labor	.43
Machinery	.33
Pallets	.19
Boxes	.60
Other purchased supplies	.07
Administrative cost	.08
Selling cost	.15
Total packing and marketing	1.85
Total costs	5.59

1/ The budget showing details for individual cost items is presented in appendix A.

Table 13--Costs for producing and marketing mature green staked tomatoes in the Manatee-Ruskin area, Florida, 1978/79 season (spring crop) 1/

Cost item	Cost
	Dollars/acre
Preharvest:	
Land rent	50.00
Machine services	213.27
Labor	533.58
Fertilizer	258.50
Pesticides	385.03
Other purchased inputs	
Plastic	90.00
Seed/plants	92.50
Other	102.51
Administrative costs	77.64
Interest on operating capital	64.13
Total preharvest	1,867.16
Yield per acre: 825 30-pound cartons	Dollars/30-lb carton
Total preharvest cost	2.26
Harvest:	
Picking and hauling	.83
Packing and marketing:	
Labor	.43
Machinery	.33
Pallets	.19
Boxes	.60
Other purchased supplies	.07
Administrative cost	.08
Selling cost	.15
Total packing and marketing	1.85
Total costs	4.94

1/ The budget showing details for individual cost items is presented in appendix A.

Total growing costs for staked tomatoes and ground tomatoes during midwinter are about the same--$2.85 per 30-pound carton for the staked and $2.82 for the ground. Staked tomatoes yield about 275 boxes per acre more than ground tomatoes, which almost completely offsets the higher per acre growing costs. Growing costs for spring crop staked tomatoes in the Manatee-Ruskin area are lower than those for the other areas.

Harvesting and packing costs tend to be lower for staked than for ground tomatoes. The cull rate at the packinghouse is lower for the staked tomatoes, and fewer of the tomatoes that are picked and run through the packing shed must be discarded. Therefore, the total harvesting and packing costs can be spread over a larger proportion of the fruit handled.

Tomatoes in Sinaloa

Most Mexican tomato exports to the United States come from the State of Sinaloa, Mexico. Three areas within Sinaloa produce tomatoes (fig. 2): Culiacan is the largest, shipping primarily vine-ripe fruit; the Guasave and Los Mochis areas export roughly half vine-ripe and half mature green.

Area, Yield, Production

The area planted in tomatoes nearly doubled from 1967/68 to 1972/73 (table 14). Then came a 3-year period of decreased acreage through the 1975/76 season. A significant recovery occurred in 1976/77, possibly a reaction to the 1976 devaluation of the peso. While planted area has risen and fallen, yields have risen moderately. The export yield per hectare over the last 5 years averaged 19.22 metric tons, while the average for the previous 5 years was 15.17 tons. This represents a 27-percent yield increase, considerably less than the 65-percent yield increase in Florida.

Figure 2

Sinaloa, Mexico:
Major Growing Areas for Fresh Winter Vegetables

Table 14--Sinaloa fresh market tomato area, export yield, and export production

Crop year	Area	Export yields per hectare	Export production
	Hectares	Metric tons	
1967/68	10,870	14.14	153,689
1968/69	12,086	16.27	196,639
1969/70	14,358	17.19	246,858
1970/71	13,010	16.75	217,916
1971/72	18,276	11.93	217,826
1972/73	20,745	13.71	284,435
1973/74	14,697	14.89	218,775
1974/75	12,884	16.07	207,095
1975/76	12,977	21.03	272,969
1976/77	15,310	20.73	317,439
1977/78	13,557	23.38	317,004

Source: [8].

The seasonal pattern of shipments remained much the same (table 15). The largest volume of shipments occurs during February, March, and April, primarily due to climatic factors governing planting dates and plant growth. Exports usually decline during May. Tomato export operations get started during December and largely terminate during June.

Cultural Practices

Tomato production in Sinaloa is of two types--staked tomatoes and ground tomatoes. Cultural practices differ markedly between the two. Ground tomatoes, which are produced primarily around Guasave and Los Mochis, require a less intensive use of inputs per hectare, and demand about one-third the investment required for staked tomatoes. Ground tomatoes, harvested as mature greens, produce only about one-third or one-fourth of the yield per hectare obtained for staked tomatoes. Staked tomatoes account for about 90 percent of Sinaloa's tomato exports.

Several changes in cultural practices have occurred since 1973/74. Greenhouse growing of seedling plants in styrofoam boxes for later transplanting, a practice which was in the experimental stage in 1973/74, is now widely followed. Growers generally have their own greenhouse for starting seedlings. The method is superior in several aspects to the old method of pulling plants from seedbeds. Plants are larger, healthier, and less susceptible to damage and disease. In addition, it facilitates earlier production because the plants are older and larger when transferred to the field.

Plant spacing, at 20 to 25 centimeters (8 to 10 inches), is closer than the 30 centimeters typical prior to the 1974/75 season. Total plant population now runs about 22,000 plants per hectare. The denser spacing and increased foliage make aerial spraying for disease and insect control inefficient after the plants reach a certain size, hence increased use of tractor-sprayers is necessary.

Heavier use of fertilizer is being practiced now than prior to 1974/75. One reason is the increased plant population, but producers also appear to be adapting more intensive production. Growers consider higher yields on smaller areas to be more profitable.

Table 15--Monthly tomato exports from Sinaloa 1/

Crop year	Dec.	Jan.	Feb.	Mar.	April	May	June	Total Dec.-June
				Metric tons				
1971/72	6,022	18,198	52,489	55,646	54,958	26,976	3,537	217,826
1972/73	3,959	35,269	57,044	72,972	65,842	42,645	8,304	286,035
1973/74	6,818	36,779	43,794	52,810	41,241	32,524	7,887	221,853
1974/75	1,479	18,661	31,592	50,053	47,543	38,512	18,501	206,341
1975/76	13,086	49,153	56,406	56,819	52,455	34,026	10,552	272,497
1976/77	10,012	40,383	60,805	79,286	81,134	36,371	8,848	316,839
1977/78	5,198	50,381	60,578	94,411	68,001	32,097	6,338	317,004

1/ Includes some tomatoes exported to Canada.
Source: [8].

The increased intensity is accomplished by more care to plant maintenance during cultivation and harvesting.

More nitrogen fertilizer is applied now as liquid ammonia. Often it is mixed with the irrigation water. Total fertilizer use per hectare ranges from 500 to 1,000 kilograms of phosphorus, and 150 to 500 kilograms of potassium. Trace elements such as copper, iron, and manganese also are added to the soil. The soil is typically fertilized with ammonia before seeding, urea or 18-46-0 (18 percent nitrogen-46 percent phosphorus-0 percent potassium) during cultivation, and liquid fertilizer during later growth and harvest.

Harvesting practices, too, are changing. Increasingly, tomatoes are picked into boxes or buckets, and dumped into large fiberglass tanks, called gondolas mounted on a truck or low trailer. The tanks, about 20 feet long by 8 to 10 feet wide and 4 feet deep, carry the tomatoes to the packing plant, where they are flushed into a receiving tank. The process saves labor and damages less fruit by not having to dump individual boxes of tomatoes. Nearly half of the producers now use this system.

At the packing plant, tomatoes pass through a waxing machine to the selection and sorting tables, where they are divided into exportable quality and domestic market quality. The exportable tomatoes are further divided by color and size and packed into two-layer or three-layer cartons. Cartons then are stacked on pallets holding 50 to 60 cartons and precooled for 12 to 18 hours before shipment to Nogales Ariz.

UNPH-CAADES regulations 7/

Regulations concerning the production and marketing of export vegetables have not changed significantly in the past 5 years. The regulations have three main thrusts: to define quality standards for export vegetables and types of containers to be used, to recommend maximum acreage to be planted, and to adjust quality requirements (upon approval of the appropriate control commissions) to decrease shipments in periods of low U.S. prices. 8/

7/ UNPH is the acronym for Union Nacional de Productores de Hortatizas (National Union of Horticultural Producers), and CAADES is the acronym for Confederacion de Asociaciones Agricolas del Estado de Sinaloa (Confederation of Agricultural Associations of Sinaloa).
8/ The control commissions are made up of growers and representatives of the grower

The minimum export standard for vine-ripe tomatoes, for example, is 65 percent U.S. No. 1. The quality standards are often raised to 70 to 85 percent U.S. No. 1 during periods of low prices to reduce supplies and strengthen prices. Other steps also may be taken to reduce volume, such as prohibiting shipment of tomatoes smaller than 2-9/32 inches in diameter, and eliminating some colors such as red or light red.

The UNPH uses the following procedures in setting recommendations for maximum acreage to be planted.

1. Producers submit, by July 20 of each year, to their local associations, the area they desire to plant and their proposed biweekly planting schedule. The maximum any one producer may solicit is 100 hectares per season. 9/ New producers may request up to 20 hectares if they can prove their financial responsibility and can satisfy certain other requirements specified by UNPH. The increase in total area handled by a packing plant cannot exceed 400 hectares in any 1 year.

2. The local associations submit, by July 31, the requests of member producers to UNPH for summarization.

3. The UNPH and CAADES, before the season begins, develop a recommended program of plantings based on their best estimate of the U.S. total demand by biweekly periods, predictions of production in Florida, Texas, California, and other countries, and predicted yield in Sinaloa. Historical trends play heavily in this analysis. By subtracting predicted production from total estimated demand, UNPH obtains a prediction of the residual market for Sinaloa. Dividing this residual demand by Sinaloa's expected yield gives the number of hectares to be recommended.

4. Upon receiving and summing the solicited programs of plantings, UNPH informs all producers of the total area solicited, and its recommendations as to maximum acreage. The total area solicited is usually larger than the area recommended, but smaller than the maximum of 100 hectares per producer. Producers also usually plant less than they solicit.

5. In a series of memoranda to producers, issued periodically, throughout the planting season, UNPH and CAADES report the total area requested, the total area recommended, and the area already seeded. Producers can then evaluate the discrepancies between planned total plantings and recommended plantings and alter their programs accordingly. However, the final decision on the acreage to plant rests with the individual grower.

Shipments to domestic markets

In addition to exports, Sinaloa shipped 151,019 metric tons of tomatoes to Mexican markets during the 1977/78 season, or 32 percent of total production (table 16). The largest volume of domestic shipments occurred in the February to May period. The proportion of total sales going to Mexican markets has not changed significantly over the last 6 years.

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organizations and the Ministry of Agriculture. The Tomato Control Commission, for example, is made up of 15 members, of which 12 are producers, and one each are from UNPH, CAADES, and the Ministry of Agriculture.. Each member has one vote.

9/ Several producers may combine their areas to provide operating units larger than 100 hectares.

10/ Total sales were calculated as the wholesale value of domestic sales plus f.o.b. Nogales values of export sales.

11/ See appendix A for a description of procedures used to estimate costs and for a detailed itemization of costs.

Net producer prices in domestic markets tend to be very low. Prices received by Sinaloa producers for domestic sales are usually considerably below Nogales prices, while costs for selling on the national market are substantial.

Although 32 percent of the total quantity of marketable tomatoes were sold in Mexican markets in 1977/78, the wholesale value of the tomatoes sold in the Mexican markets was only about 15 percent of the value of total sales. 10/ Sinaloa producers encounter stiff competition from other Mexican production areas for domestic market.

It appears the domestic market is largely a secondary or refuge market and a market for nonexportable sizes and qualities. The characteristics of tomatoes sold in Mexican markets are somewhat different from the tomatoes sold in the United States. Normally, domestic tomatoes do not meet the grade and size minimums specified by UNPH for export tomatoes or are ripe fruit which do not hold up to the rigors of shipment to the U.S. markets. In periods of low U.S. prices, Mexican shippers even divert the smaller export tomatoes to Mexican markets in hopes of restricting export supply and strengthening U.S. prices.

Costs

Staked tomatoes account for about 90 percent of the tomatoes exported from Sinaloa, so costs of production will be presented only for staked tomatoes (vine-ripes). 11/ Labor, the major preharvest cost item, also constitutes most of the harvest cost and an important, though smaller, part of packing and marketing costs (table 17). Total preharvest costs were $1,309.57 per acre in 1978/79. Major preharvest cost items, in addition to labor, were fertilizer, machine services, pesticides, and stakes.

Harvesting costs, primarily for labor, amounted to $1.05 per 30-pound-equivalent carton marketed. Everyday picking of vine-ripe tomatoes incurs high harvesting costs despite lower wage rates.

Table 16--Monthly tomato shipments from Sinaloa to Mexican markets

Month	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78
			Metric tons			
December	1/	3,776	875	3,828	2,356	5,225
January	10,116	13,125	7,950	16,311	11,968	20,340
February	25,391	15,387	15,548	23,587	30,511	31,299
March	29,723	29,759	31,877	30,498	33,061	38,822
April	33,571	26,647	32,736	40,697	31,840	25,855
May	29,385	21,379	28,595	22,335	22,144	22,605
June	7,501	6,324	6,764	18,181	8,072	6,863
Total	135,687	116,397	124,346	155,436	139,952	151,009
			Percent			
Percentage of total shipments	32	35	37	43	31	32

1/ Data not obtained for this month.
Source: (8).

Table 17--Costs for producing and marketing vine-ripe staked tomatoes in Sinaloa, 1978/79 1/

Cost item	Total cost	Cost charged to export tomatoes 2/
	Dollars/acre	
Preharvest:		
Land rent	88.62	75.33
Machine services	200.65	170.55
Labor	285.69	242.84
Fertilizer	212.71	180.80
Pesticides	141.81	120.54
Other purchased inputs		
Stakes	141.81	120.54
Cord and wire	60.87	51.74
Polyfoam boxes	34.30	29.16
Other	27.05	22.99
Administrative costs	53.70	45.64
Interest on operating capital (12 percent for 5 months)	62.36	53.00
Total preharvest	1,309.57	1,113.13
Export yield per acre: 890 30-pound carton equivalent		Dollars per 30-lb carton
Total preharvest cost	1.47	1.25
Harvest:		
Picking	.98	.83
Hauling	.07	.06
Total harvest	1.05	.89
Packing and marketing:		
Labor	N.A.	.18
Machinery	N.A.	.38
Pallets	N.A.	.02
Cartons	N.A.	.78
Other purchased supplies	N.A.	.14
Administrative costs	N.A.	.15
Selling costs		
Transport to Nogales	N.A.	.60
Crossing charges and fees	N.A.	.07
Tariff	N.A.	.56
Sales commission (10 percent)	N.A.	.60
Mexican taxes (nonincome type)	N.A.	.13
Total packing and marketing	N.A.	3.61
Total costs	N.A.	5.75

N.A. = not applicable.
1/ The budget showing details for individual cost items is presented in appendix A.
2/ The joint costs for preharvest and harvesting were prorated among export tomatoes (85 percent) and tomatoes marketed in Mexico (15 percent).

Packing and marketing cost $3.61 per 30-pound-equivalent carton--with the cost of cartons being the largest single item at $0.78 each. Total packing costs were $1.65 per 30 pounds, which was near the Florida costs. However, costs to transport tomatoes to Nogales (60 cents per 30 pounds), plus a tariff of 56 cents, and a sales commission of 10 percent were substantial added costs. Total marketing costs beyond the packing plant were about $1.96 per carton.

Tomatoes for the domestic market and tomatoes for export are essentially joint products. All production costs up to and including picking costs and costs of transporting the tomatoes to the unloader at the packing plant are joint costs, and should be allocated to each product according to some acceptable procedure. There is no single correct way to allocate joint costs. In the present study, joint costs were allocated according to the value of fruit going to each market. This method appeared the most consistent with the objective of evaluating Mexican growers' longrun decision of whether to grow tomatoes for export. The value of domestic sales averaged about 15 percent of the total value of tomatoes sold.

Allocating 15 percent of the preharvest and harvesting cost to domestic production gives a total preharvest cost for export production of $1.25 and a harvest cost of $0.89 per carton. Packing and marketing costs for tomatoes going to the export market are identifiable and were separated from those for domestic production (except for overhead plant costs). The $3.61 marketing cost in table 17 is that for export production alone. Total cost per box for growing, harvesting, packing, and marketing f.o.b. Nogales sums to $5.75.

Mexico's total cost is similar to that for Florida's midwinter production--$5.75 per carton in Mexico versus $5.72 for Florida ground tomatoes and $5.59 for Florida staked tomatoes. Florida's production costs in the May to June period are $0.81 per carton higher than Mexican costs. Higher packing and marketing charges for Mexico offset higher growing costs in Florida. Packing and selling costs in Florida range from $1.85 to $2 per carton. The Mexican cost for packing and selling was $3.61 per carton, of which $1.36 was for transportation from the packing shed in Sinaloa to Nogales and for export charges at Nogales. Harvesting costs are about the same in the two areas.

Peppers in Florida

Peppers are grown in a number of areas throughout Florida during the winter season. Two areas account for the largest share of total production--the southeast and the southwest. The southeast area extends from southern Martin County parallel to the Atlantic coast through Palm Beach County to northern Broward County. The southwest area consists of Collier and Lee Counties. This report deals with production in those two areas, although a spring crop of peppers is grown on about 3,000 acres in the west central and north central areas of the State.

The area devoted to peppers has increased over the past five seasons, reaching 20,400 planted acres during 1977/78 (table 18). The southwest, by far the major production area, accounts for nearly 60 percent of Florida's total. Yields have not shown dramatic increases since 1973/74. The net effect of constant yields and larger acreage has been increasing production, reaching the all-time high of 8 million bushels during 1977/78. Total value of that season's crop was $42 million.

Cultural Practices

Although there is a trend toward growing more peppers on full-bed plastic mulch, the practice has not been adopted to the same extent as in tomato production. Peppers grow in raised beds spaced 6 feet apart center to center. Generally, a bed consists

Table 18--Florida green pepper acreage, yield, production, and value

Crop year	Acreage		Yield per acre	Production	Value per bushel	Value
	Planted	Harvested				
	-----Acres--------		Bushels	1,000 bushels	Dollars	1,000 dollars
1967/68	17,100	16,200	454	7,360	3.50	25,790
1968/69	17,900	16,700	381	6,360	3.31	21,050
1969/70	15,700	12,800	268	3,432	5.58	19,164
1970/71	15,400	13,600	335	4,560	3.90	17,772
1971/72	14,100	12,800	435	5,564	4.09	22,772
1972/73	14,800	14,100	459	6,468	4.14	26,762
1973/74	14,100	13,400	473	6,336	4.90	31,034
1974/75	15,600	14,900	510	7,604	4.96	37,695
1975/76	16,800	15,900	454	7,220	5.45	39,326
1976/77	21,100	16,800	400	6,720	5.66	38,054
1977/78	20,400	18,800	434	8,164	5.17	42,188

Source: [11].

of two rows with plants spaced at 1-foot intervals down the row. There may be one or two plants per hill.

Regular applications of fungicides and insecticides provide for control of diseases and insects. Maneb and copper are typical fungicides. Lannate and Cygon are typical insecticides. Virus diseases are a problem in the southeast, and the spray program there includes additional treatment to control aphids--a carrier of the viral infection.

Surface irrigation is common in both areas. Deep wells supply irrigation water in the southwest, while in the southeast irrigation water is pumped from canals maintained by local drainage districts.

Most peppers are picked into buckets, dumped into bulk pallets, and transported to the packing shed, where they are graded and packed. Selling is usually done by a salesman working on commission or on salary. In the southeast, some peppers are harvested with the aid of a mobile packing shed. Peppers are picked and placed on a conveyor which carries them to the mobile packing shed as it moves down the rows through the field. Grading and packing is done in the field, and the peppers are hauled to a State farmers' market for sale and shipment.

Progressive growers in the southwest area should average 650 bushels packed per acre. In the southeast, a good yield would be 725 bushels. The State average yield during 1977/78 was 434 bushels per acre.

Market Regulations

Florida has no marketing order for peppers. Most peppers are shipped in a standard 1-bushel carton or a 1-1/9 bushel crate.

Cost

Labor is the single most important cost item (table 19 and appendix A). Other important items are pesticides, fertilizer, machine services, and plastic. Total preharvest costs were $2.98 per bushel in 1978/79. Harvest costs of $1.03 were primarily labor expenses. Packing and marketing costs were $1.80. All costs, f.o.b. the packing shed, were $5.81 per bushel.

Peppers in Sinaloa

The area planted to peppers declined sharply following the 1971/72 season (table 20). The Florida freeze in January 1977 resulted in high prices and good returns to Mexican growers for the 1976/77 season, and apparently motivated a 50-percent increase in planting for 1977/78. Planted area, however, is still below pre-1973/74 levels.

Pepper yields per hectare are at least double the yields of the early 1970's. Higher yields are due primarily to better management practices. In spite of the smaller planted acreage in recent years, export production has increased due to the higher yields. Production during the 1977/78 season reached a record 51,090 metric tons. Sinaloa exports its largest volume of bell pepper shipments during January, February, and March (table 21). Weather and disease problems prevent extensive production early and late in the season.

Cultural Practices

The most significant improved cultural practice for peppers is the widespread use of containerized transplants from greenhouses. The transplant growing procedure is the same as for tomatoes. Planting of older, healthier plants reduces disease problems and allows a better stand of plants. Because of their lighter weight fruit, pepper plants require less staking than tomatoes. Normally, stakes are spaced at 6 to 10-foot intervals with twine or wire strung between the stakes to support the plants.

Peppers cannot be immersed in water as tomatoes can, hence after having been picked, peppers are placed in large boxes for hauling to the packing shed. At the packing shed, overhead cranes lift the boxes and dump the peppers.

One problem yet to be solved in pepper production is the development of a pesticide that controls worms but leaves no toxic residue in the fruit. Some peppers are rejected at the border because of residues.

Regulations

Producers submit their production plans to the local grower associations which in turn forward them to UNPH, as in the case of tomatoes. However, very little market coordination is practiced for bell peppers, except that quality standards may be raised in time of low prices. A committee of 11 members, comprised mostly of producers, is established to change quality standards, if necessary.

Costs

Sales to domestic markets are very limited. The U.S. market is practically the only outlet, and the peppers not exported are destroyed. Hence, all costs were charged to peppers for the export market.

Table 19--Costs for producing and marketing green peppers in Florida, 1978/79 season 1/

Cost item	Cost
	Dollars/acre
Preharvest:	
Land rent	51.00
Machine service	313.02
Labor	556.19
Fertilizer	211.29
Pesticides	402.32
Other purchased inputs	
Plastic	180.00
Plug mix	75.00
Seed	45.00
Administrative costs	82.48
Interest on operating capital	67.75
Total preharvest	1,984.05
Yield per acre: 665 bushels	Dollars/bushel
Total preharvest	2.98
Harvesting:	
Picking	.80
Hauling	.23
Total havest	1.03
Packing and marketing:	
Labor	.40
Machinery	.29
Pallets	.17
Boxes	.60
Other purchased inputs	.06
Administrative	.08
Selling cost	.20
Total packing and marketing	1.80
Total costs	5.81

1/ Preharvest cost is a weighted average of the cost for Palm Beach County (20 percent) and southwest Florida (80 percent). Harvesting, packing, and marketing costs are those for southwest Florida. Budgets showing details for individual cost items are presented in appendix A.

Table 20--Sinaloa green pepper acreage, export yield, and export production

Crop year	Area	Export yield per hectare	Export production
	Hectares	- - - Metric tons - - -	
1970/71	4,979	6.52	32,495
1971/72	5,397	4.30	23,186
1972/73	4,869	7.22	35,138
1973/74	3,743	10.39	38,889
1974/75	1,676	13.32	22,319
1975/76	2,629	11.36	29,847
1976/77	2,248	17.74	39,875
1977/78	3,451	14.80	51,090

Source: [8].

Table 21--Monthly exports of Sinaloa green peppers

Month	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78
	Metric tons							
November	194	252	60	416	22	94	320	204
December	2,902	1,319	1,227	4,579	1,136	3,459	3,079	3,773
January	8,273	5,831	8,122	10,868	4,407	9,038	8,657	11,420
February	9,326	7,758	11,100	11,524	7,340	9,713	11,618	15,213
March	7,293	5,826	9,530	8,793	5,561	5,602	10,781	13,004
April	3,544	1,949	4,734	2,440	3,312	1,906	6,341	7,066
May	815	251	363	269	541	35	1,064	410
Total	32,495	23,186	35,138	38,889	22,319	29,847	41,860	51,090

Sources: [8, 1976/77, 1977/78; CAADES, unpublished data].

Preharvest production costs for peppers during the 1978/79 season were an estimated $1,157.30 per acre (table 22). The 20-metric-ton per hectare assumed yield equals 645 bushels per acre. Yields per hectare over the past three seasons averaged 14.6 tons (470 bushels per acre). Estimates of costs of production for this study represent cultural practices slightly better than average, hence assumed yield was accordingly set higher than the average. Preharvest cost per bushel, based on a yield of 645 bushels per acre, was $1.79.

Harvesting costs were mainly for labor. Sixty-five percent of the packing and selling costs, or $2.61 per bushel, were for transport to Nogales, tariff, and other charges beyond the packing shed. Total cost, f.o.b. Nogales, was $6.50 per bushel.

Mexico's preharvest and harvesting costs were lower than Florida's. However, its total costs were $0.71 per carton higher than the Florida costs because of higher packing and marketing costs for Mexican peppers. The $4.03 per bushel packing and marketing costs in Mexico were $2.23 higher than in Florida; the difference was due mainly to transportation to Nogales and export charges. Florida, of course, does not have such costs.

Cucumbers in Florida

Southwest Florida (Collier, Henry, and Lee Counties) grow most of Florida's cucumbers. A smaller acreage is grown in the Plant City and Wauchula areas of west central Florida. Most of Florida's cucumber crop is marketed during the spring and fall because cucumbers are very susceptible to damage from cold weather. January, February, and March sales account for less than 10 percent of the total Florida crop.

The planted and harvested area of cucumbers remained relatively constant over the past 10 years. Planted acreage during 1977/78 was 16,500 acres (table 23). Yields per acre have risen slightly: the average for the last five seasons was 265 bushels per acre, while the average for the previous five seasons was 213. Total production, too, increased slightly, reaching 4.4 million bushels during 1977/78. Value of the 1977/78 crop was $22 million.

Cultural Practices

Use of plastic mulch has not been adopted in cucumber production to the extent it has in tomatoes and peppers. Some growers use mulch, but usually they plant cucumbers on old plastic, following a different crop. This practice permits spreading the costs of plastic over two crops as well as recovering some of the fertilizer not used by the first crop.

Pest control generally includes regular applications of Maneb and copper for disease control, and the use of Lannate and Cygon for insect control.

Cucumbers grow on raised beds. Irrigation water from deep wells is applied by seepage irrigation. A system of throwout pumps discharges excess water from the field during heavy rainfall.

Cucumbers are handpicked into buckets from which they are dumped into field pallets, each of which holds about 900 pounds. They are then transported to a packing shed for washing, waxing, grading, and packing. Commercial brokers or salaried employees handle the selling for the packers.

Table 22--Sinaloa green peppers: costs for producing and marketing, 1978/79 1/

Cost item	Cost
	Dollars/acre
Preharvest:	
Land rent	88.62
Machine services	198.18
Labor	242.06
Fertilizer	117.63
Pesticides	212.71
Other purchased inputs	
Stakes	44.31
Cord and wire	35.45
Polyfoam boxes	46.76
Other	69.02
Administrative costs	47.45
Interest on operating capital (12 percent for 5 months)	55.11
Total preharvest	1,157.30
Export yield: 645 bushels per acre	Dollars/bushel
Total preharvest	1.79
Harvest:	
Picking	.63
Hauling	.05
Total harvesting	.68
Packing and marketing:	
Labor	.16
Machinery	.20
Pallets	.02
Boxes	.69
Other purchased supplies	.15
Administrative costs	.20
Selling costs	
Transport to Nogales	.85
Crossing charges	.09
Tariff	.70
Sales commission	.94
Production taxes	.03
Total packing and marketing	4.03
Total costs	6.50

1/ The budget showing details for individual cost items is presented in appendix A.

Table 23--Florida cucumber acreage, yield, production, and value

Crop year	Acreage		Yield per acre	Production	Value per bushel	Total crop value
	Planted	Harvested				
	-----Acres-------		Bushels	1,000 bushels	Dollars	1,000 dollars
1967/68	17,500	16,600	248	4,125	3.14	12,962
1968/69	18,300	17,000	178	3,033	4.02	12,207
1969/70	17,200	15,000	188	2,827	3.63	10,249
1970/71	16,800	14,100	204	2,873	3.84	11,038
1971/72	15,900	14,500	251	3,638	3.98	14,477
1972/73	15,300	14,400	245	3,523	3.74	13,184
1973/74	14,100	13,000	231	3,006	4.87	14,643
1974/75	15,000	14,600	276	4,025	4.57	18,404
1975/76	16,000	15,400	282	4,344	3.64	15,806
1976/77	16,100	15,000	253	3,802	5.19	19,726
1977/78	16,500	15,800	282	4,450	5.03	22,398

Source: [11].

Regulations

No marketing order covers cucumbers in Florida. Cucumbers usually are marketed in standard size containers such as bushel cartons or 1-1/9 bushel crates. Although generally not inspected according to U.S. standards for grades, the terminology of the standards often is used in selling Florida cucumbers.

Costs

Preharvest operations for growing a 275-bushel yield of cucumbers cost $971.48 per acre ($3.53 per bushel) during the 1978/79 season (table 24). Labor, machinery, and fertilizer costs were the major preharvest expenses.

The major portion of harvesting costs was for hand picking. Cartons were the largest single cost item in packing and marketing costs. Total of all costs, f.o.b. the shipping point, was $6.91 per bushel.

Cucumbers in Sinaloa

The area planted to cucumbers through 1977/78 declined sharply from 1971/72 levels (table 25). The planted area recovered slightly after reaching a low point in 1974/75, but was still below previous levels. The Culiacan area accounts for 80 percent of the planted area in Sinaloa. Yields of cucumbers increased remarkably after 1971/72. During the last three seasons, yields averaged 25.2 tons per hectare compared with 13.6 tons during the previous three--an increase of 85 percent. Total production in 1977/78 reached 93,515 metric tons.

Table 24--Florida cucumbers: costs for producing and marketing, 1978/79 1/

Cost item	Cost
	Dollars/acre
Preharvest:	
Land rent	40.00
Machine services	228.25
Labor	289.64
Fertilizer	194.00
Pesticides	103.00
Seed	50.00
Administrative costs	40.72
Interest on operating capital	25.87
Total preharvest	971.48
Yield per acre: 275 bushels	Dollars/bushel
Total preharvest	3.53
Harvest:	
Picking	1.20
Hauling	0.23
Total harvesting cost	1.43
Packing and marketing:	
Labor	0.45
Machinery	0.34
Pallets	0.20
Boxes	0.60
Other purchased supplies	0.07
Administrative	0.09
Selling cost	0.20
Total	1.95
Total costs	6.91

1/ The budget showing details for individual cost items is presented in appendix A.

Cultural Practices

Increased yields are due primarily to technological changes and increased intensity in production. Most cucumbers are now staked in the same way as tomatoes, with large stakes every 8 to 10 feet interspaced with several small stakes and a number of strings to support the plants. Cucumbers are seeded directly by tractor and planter. Heavier fertilization rates also are being used. Typically, 400 to 600 pounds of nitrogen are applied per hectare, primarily in the form of urea, diammonium phosphate, and ammonium nitrate. A similar amount of phosphate, usually triple-super phosphate, and about 300 to 400 pounds of potassium also are applied per hectare.

Mexican growers sell about 14 percent of their total cucumber production in the domestic market, with the largest share going to Mexico City.

Regulations

As with tomatoes and peppers, cucumber growers submit their request for planting their desired acreage with their local grower association, which forwards the requests to UNPH for compilation and summarization. UNPH then issues a recommended level of total plantings concurrently with the total requested acreage. Individual growers have wide latitude in deciding how much to plant. UNPH and CAADES enforce quality standards and container specifications, and an 11-member control commission, composed mostly of producers, monitors cucumber exports. Minimum quality standards are rarely changed as a result of cucumber price movements.

No controls have been established for cucumbers sold in the domestic markets.

Table 25--Sinaloa cucumber area, export yield, and export production

Crop year	Area	Export yield per hectare	Export production
	Hectares	--------Metric tons--------	
1971/72	6,661	7.69	51,223
1972/73	5,614	11.08	62,203
1973/74	4,898	12.61	61,764
1974/75	2,195	17.12	37,578
1975/76	2,910	23.13	67,308
1976/77	3,307	23.20	76,722
1977/78	3,196	29.26	93,515

Source: [8].

Costs

Preharvest operations cost $993.96 per acre or $1.99 per bushel for a 500-bushel yield (table 26). 12/ The largest cost item for the harvesting, packing, and selling costs were the U.S. tariff, transport to Nogales, sales commission, and cartons. Together they accounted for more than half the total cost per bushel.

Total costs for Mexican cucumbers are $0.46 per bushel higher than the Florida costs. The source of the higher costs is Mexico's additional marketing costs. Although preharvest and harvesting costs are lower in Mexico, packing and marketing costs more than offset its growing and harvesting cost advantages.

Eggplants in Florida

Two-thirds of Florida's eggplant production grows in the southeast (Broward and Palm Beach Counties). Small acreages also are located in southwest Florida and in the central parts of the State. Eggplant acreage has remained relatively constant in Florida over the past 10 years (table 27). Yields, however, have increased dramatically. During the past five seasons, yields averaged 677 bushels per acre, compared with 503 for the previous five. Total production also rose, reaching 1,484,000 bushels in 1977/78. Value of the 1977/78 crop was $5.6 million.

Cultural Practices

Much of the yield increase is attributable to greater use of full-bed plastic mulch. Most of the State's eggplant production now grows with mulch. Eggplants grow in raised rows, usually spaced 6 feet center to center, with the plants spaced 18 inches down the row. The soils are fumigated for control of soil-borne diseases and pests. Planting is done with transplants.

Pest control consists of spraying every 5 to 7 days. Typical spray materials are Maneb and copper for disease control, and Lannate and Cygon for insect control.

Two harvesting methods are used in Florida. One consists of picking the eggplants and dumping them into bulk pallets for transport to a permanent packing shed, where they are washed, graded, and packed. The second consists of placing picked eggplants onto a conveyor, which carries the eggplants to a portable packing shed moving through the field. A typical yield for operators using intensive cultural practices is 875 bushels per acre; that yield was used in the eggplant budget (table 28). Most of the eggplants in the southeast are hauled to the State farmers' market at Pompano Beach, where they are consigned to a broker who sells them for a set fee per package.

Regulations

There is no market order for eggplant in Florida. Most eggplants are marketed in bushel cartons or 1-1/9 bushel crates. Although there are no required grading standards, eggplants are usually marketed as fancy, number 1, or unclassified.

12/ Although about 14 percent of the total volume is sold in Mexican markets, no price data were available for domestic sales and it was not possible to allocate joint costs as was done with tomatoes. Hence, all costs were charged to export cucumbers. Had growing and harvesting costs been prorated among domestic and export cucumbers on the basis of volume shipped to each market, total costs would have been lowered to $0.37 per bushel.

Table 26--Sinaloa cucumbers: costs for producing and marketing, 1978/79 1/

Cost item	Cost
	Dollars/acre
Preharvest:	
Land rent	88.62
Machine services	139.70
Labor	185.55
Fertilizer	166.34
Pesticides	107.03
Other purchased inputs	
Stakes	141.81
Cord and wire	60.87
Other	15.95
Administrative costs	40.76
Interest on operating capital	47.33
Total	993.96
Export yield: 500 bushels/acre	Dollars/bushel
Total preharvest	1.99
Harvest:	
Picking	.61
Hauling	.05
Total harvest	.66
Packing and marketing:	
Labor	.17
Machinery	.20
Pallets	.04
Boxes	.69
Other purchased supplies	.09
Administrative costs	.23
Selling costs	
Transport to Nogales	1.03
Crossing charges	.09
Tariff	1.35
Sales commission	.74
Fees	.09
Total packing and marketing	4.72
Total costs	7.37

1/ The budget showing details for individual cost items is presented in appendix A.

Table 27--Florida eggplant acreage, yield, production, and value

Crop year	Acreage		Yield per acre	Production	Value per cwt	Value
	Planted	Harvested				
	------Acres-------		Bushels	1,000 bushels	Dollars	1,000 dollars
1967/68	2,200	2,100	465	976	3.19	3,116
1968/69	2,200	2,200	437	961	3.39	3,255
1969/70	2,050	2,000	376	752	3.62	2,722
1970/71	1,950	1,870	511	955	2.81	2,682
1971/72	1,800	1,750	597	1,045	3.12	3,257
1972/73	1,850	1,800	596	1,073	3.48	3,734
1973/74	1,850	1,800	643	1,158	3.62	4,189
1974/75	2,200	2,150	692	1,488	3.71	5,521
1975/76	2,400	2,300	688	1,582	3.06	4,841
1976/77	2,250	1,950	701	1,367	3.90	5,332
1977/78	2,400	2,250	660	1,484	3.80	5,636

Source: [11].

Table 28--Florida eggplants: costs for producing and marketing, 1978/79 1/

Cost item	Cost
	Dollars/acre
Preharvest:	
Land rent	95.00
Machine services	315.84
Labor	756.44
Fertilizer	250.25
Pesticides	445.00
Other purchased inputs	
Plastic	180.00
Plants	175.00
Administrative costs	99.79
Interest on operating capital	99.33
Total preharvest	2,416.65
Yield per acre: 875 bushels	Dollars/bushel
Total preharvest	2.76
Harvest, packing, and marketing:	
Labor	.67
Machinery	.07
Boxes	.60
Purchased supplies	.15
Transportation	.15
Selling	.20
Total harvest, packing, and marketing	1.84
Total costs	4.60

1/ Based on budget for eggplant production in Palm Beach County, Florida. The budget showing details for individual cost items is presented in appendix A.

Costs

Preharvest operations for growing eggplant with a yield of 875 bushels per acre cost $2,416.65 per acre ($2.76 per bushel) with 1978/79 season prices (table 28). Labor is the major cost item with pesticides, fertilizers, and machinery costs being other major costs. Cartons and labor are the major cost items for harvesting, packing, and marketing. Total costs were estimated at $4.60 per bushel, f.o.b. the State farmers' market in Pompano Beach.

Eggplants in Sinaloa

The current area planted to eggplant in Sinaloa is considerably below the levels of the early 1970's (table 29). Only 484 hectares were planted in 1977/78. Several producers who previously planted small acreages discontinued it in favor of other products. The average yield has increased considerably, due in part to some less efficient producers having discontinued operations, and to the general tendency for increased intensity of production. Because of declining area, total production shows no significant trend despite rising yields.

Cultural Practices

Transplanting of containerized seedlings grown in greenhouses was common in 1978/79. Otherwise, cultural practices had not changed since 1973/74. Eggplants are staked in the same manner as tomatoes and cucumbers. Plants are spaced about 18 inches apart and rows are almost 6 feet apart, for a plant population of about 4,000 per acre.

Common production problems include the hot sun tending to inhibit the desired dark color, and the fruit retaining toxic residues from pesticides.

Harvesting begins 65 to 70 days after transplanting into the field. Normally the plant produces for 4 months with one picking per week. When the export price drops to an unprofitable level, the plants are destroyed and the remaining fruit fed to livestock. Insignificant sales are made in domestic markets.

Table 29--Sinaloa eggplant area, yield, and total production

Crop year	Area	Yield	Production
	Hectares	--------Metric tons----------	
1971/72	948	13.09	12,409
1972/73	831	21.54	17,902
1973/74	917	16.14	14,799
1974/75	522	23.08	12,048
1975/76	591	24.35	14,394
1976/77	423	33.87	14,327
1977/78	484	36.26	17,550

Source: [8].

Regulations

The same basic structure of regulation exists for eggplant as for tomatoes, peppers, and cucumbers. Producers file planting requests with UNPH, which summarizes the requests and publishes figures on total acreage requested and acreage recommended. This practice helps prevent excessive plantings, but individual producers retain considerable flexibility over planted acreage.

A Control Commission for Eggplant, composed of producer representatives, can raise quality standards above minimum export standards at any time during the marketing season for the purpose of reducing sales and increasing temporarily depressed prices. The border inspectors cooperate with UNPH and CAADES in helping to enforce the quality standards adopted by the Control Commission.

Costs

Preharvest operations for growing eggplant with a yield of 950 bushels per acre cost an estimated $1,169.01 per acre ($1.23 per bushel) for the 1978/79 season (table 30). Labor was the major cost item, with fertilizer and machine services not far behind. A major part of the harvesting, packing, and selling cost was for transport to Nogales and for crossing and selling charges. Total cost per bushel, f.o.b. Nogales, was $4.85.

Florida's $0.25 per bushel total cost advantage in eggplant is due to lower marketing charges. Mexico's $1.53 per bushel preharvest cost advantage was more than overcome by its large packing and marketing cost.

COST CHANGES IN FLORIDA AND SINALOA

Total costs in Florida and Sinaloa during four different seasons (1967/68, 1970/71, 1973/74, and 1978/79) for the vegetables considered in this study are shown in tables 31 and 32. Changes in the cost competitive positions of Florida and West Mexico can be assessed by comparing changes in these total costs. If, for example, Florida's costs advanced over the past 5 years at a slower rate than Sinaloa's costs, then Florida would have improved its cost competitive position relative to Mexico. That is not to say that Florida would have a competitive advantage over Mexico; it indicates only that Florida would have improved its cost competitive advantage or would have reduced its cost disadvantage.

Comparative changes in relative costs (table 33) between 1973/74 and 1978/79 provide an assessment of changes in the cost competitive positions of Florida and Sinaloa defined as the ratio of Mexican to Florida costs. For example, the 1973/74 production cost for a 30-pound carton of Mexican vine-ripe tomatoes was $4.52, and the Florida production cost for a 30-pound carton of mature green ground tomatoes was $5. The ratio, $4.52 \div 5 = .904$, indicates that Mexico had a cost advantage. By 1978/79, the ratio had increased to 1.029 indicating that Florida then had a cost advantage, and that its cost competitive position had improved since 1973/74.

Tomatoes

Three cost comparisions for tomatoes are made between Florida and Sinaloa. The production costs for mature green ground tomatoes from Dade County and winter crop staked tomatoes from southwest Florida are representative of production costs during the mid-December to May 1 period. The spring crop staked tomatoes from the Manatee-Ruskin area are representative of costs for tomatoes shipped during May and early June. Only vine-

Table 30--Sinaloa eggplants: costs for producing and marketing, 1978/79 1/

Cost item	Cost
	Dollars/acre
Preharvest:	
Land rent	88.62
Machine services	176.32
Labor	285.45
Fertilizer	212.71
Pesticides	70.90
Other purchased inputs	
Stakes	141.81
Cord and wire	60.87
Polyfoam boxes	15.58
Other	13.12
Administrative costs	47.94
Interest on operating capital (12 percent for 5 months)	55.66
Total preharvest	1,168.98
Export yield: 950 bushels per acre	Dollars/bushel
Total preharvest	1.23
Harvest:	
Picking	.30
Hauling	.06
Total harvest	.36
Packing and marketing:	
Packing labor	.18
Machinery	.20
Pallets	.02
Boxes	.72
Other purchased inputs	.03
Administrative costs	.16
Selling costs	
Transport to Nogales	.93
Crossing charges	.08
Tariff	.38
Sales commission	.50
Fees	.06
Total packing and marketing	3.26
Total costs	4.85

1/ The budget showing details for individual cost items is presented in appendix A.

Table 31--Florida production costs, f.o.b. the packinghouse for growing, harvesting, and marketing fresh winter tomatoes, peppers, cucumbers, and eggplants

Commodity and cost item	1967/68 1/	1970/71 1/	1973/74 1/	1978/79
		Dollars/30-lb carton		
Tomatoes:				
Mature green, staked (winter crop)				
Preharvest	--	--	2.65	2.85
Harvest, pack, sell	--	--	2.35	2.74
Total	--	--	5.00	5.59
Mature green, ground (winter crop)				
Preharvest	0.94	1.05	2.59	2.82
Harvest, pack, sell	1.02	1.40	2.20	2.92
Total	1.96	2.45	4.79	5.72
Mature green, on stakes (spring crop)				
Preharvest	--	--	--	2.26
Harvest, pack, sell	--	--	--	2.68
Total	--	--	--	4.94
		Dollars/bushel		
Bell peppers:				
Preharvest	0.95	1.01	2.16	2.98
Harvest, pack, sell	1.69	2.11	2.21	2.83
Total	2.64	3.12	4.37	5.81
Cucumbers:				
Preharvest	0.82	0.89	2.68	3.53
Harvest, pack, sell	1.99	2.48	2.66	3.38
Total	2.81	3.37	5.34	6.91
Eggplant:				
Preharvest	0.77	0.80	1.87	2.76
Harvest, pack, sell	1.18	1.58	1.33	1.84
Total	1.95	2.38	3.20	4.60

-- = Not available for this season.
1/ Production costs from [10, 15].

Table 33--Ratio of Sinaloa costs to Florida costs for producing fresh winter tomatoes, peppers, cucumbers, and eggplants

Commodity	1967/68	1970/71	1973/74	1978/79
		Ratio 1/		
Tomatoes:				
Staked (winter)	--	--	0.904	1.029
Ground (winter)	1.490	1.237	.944	1.002
Staked (spring)	--	--	--	1.164
Peppers	1.621	1.205	.918	1.119
Cucumbers	1.783	1.445	1.146	1.067
Eggplant	1.179	1.000	1.062	1.054

-- = Not available for this season.
1/ Calculated as (Sinaloa cost) ÷ (Florida costs), from tables 31 and 32. A value less than 1 means that Mexico had the cost advantage; a value greater than 1 means that Florida had the cost advantage.

Table 32--Sinaloa production costs, f.o.b. Nogales, Ariz., for growing, harvesting, and marketing fresh winter tomatoes, peppers, cucumbers, and eggplants

Commodity and cost item	1967/68 1/	1970/71 1/	1973/74 1/	1978/79
		Dollars/30-lb carton equivalent		
Vine-ripe tomatoes				
Preharvest	0.46	0.48	0.94	1.25
Harvest, pack, and sell	.93	.99	1.74	2.54
Export costs 2/	1.53	1.56	1.84	1.96
Total	2.92	3.03	4.52	5.75
		Dollars/bushel		
Bell peppers				
Preharvest	1.30	0.74	0.94	1.79
Harvest, pack, and sell	1.19	1.22	1.45	2.10
Export costs 2/	1.79	1.80	1.62	2.61
Total	4.28	3.76	4.01	6.50
Cucumbers				
Preharvest	1.06	.87	1.58	1.99
Harvest, pack, and sell	1.28	1.30	1.67	2.08
Export costs 2/	2.67	2.70	2.87	3.30
Total	5.01	4.87	6.12	7.37
Eggplant				
Preharvest	.31	.33	.72	1.23
Harvest, pack, and sell	.96	.98	1.10	1.67
Export costs 2/	1.03	1.07	1.58	1.95
Total	2.30	2.38	3.40	4.85

1/ Production costs from [10, 15].
2/ Includes cost of transport from Sinaloa to Nogales, Arizona, and export fees to Nogales.

ripe costs were available for Sinaloa during the 1978/79 season. Therefore, production costs for Florida mature green tomatoes were compared with costs for Sinaloa vine-ripe tomatoes.

Total costs (tables 31 and 32) increased between the 1973/74 and 1978/79 seasons in both Florida and Mexico, but more in Mexico than in Florida. Higher yields in Florida appeared to moderate the cost increases. Preharvest costs per 30-pound carton for Florida's winter staked production increased by only $0.20. The preharvest cost increase for Florida ground tomatoes, too, was small, moderating the rise in total cost.

Florida improved its cost competitive position in tomato production between 1973/74 and 1978/79. Sinaloa vine-ripe tomatoes had a cost advantage over Florida in 1973/74--the Sinaloa costs being about 90 percent of the Florida staked tomato costs, and 94 percent of Florida ground tomato costs. By 1978/79, the Mexican costs had increased to about 102.9 percent of Florida's staked tomato costs, and just equal to the costs of Florida ground tomatoes.

Florida has a cost advantage over Sinaloa in the spring, when production from the Manatee-Ruskin area is being marketed. The ratio of Sinaloa costs to spring tomato production costs in Florida was about 1.164 indicating that Sinaloa's costs were more than 16 percent greater. Neither Florida nor Sinaloa have a clear cost advantage in midwinter, when the south Florida areas ship their largest volumes.

Peppers

Florida improved its cost competitive position relative to Mexico in pepper production between 1973/74 and 1978/79. Total costs rose substantially in both Florida and West Mexico, but rose more in Mexico than in Florida--62 percent versus 33 percent. Mexico's pepper production costs increased from being 8 percent less than Florida's in 1973/74, to being 12 percent greater than Florida's in 1978/79.

Cucumbers

Florida continued its cost advantage relative to Sinaloa in cucumber production through the 1978/79 season, although the advantage was smaller than in previous years. Florida's production costs for cucumbers increased faster than Sinaloa's. The Florida costs increased from $5.34 per bushel in 1973/74 to $6.91 in 1978/79, or about 29 percent. Sinaloa's costs increased from $6.12 to $7.37, a 20-percent increase.

Mexico's cucumber cost disadvantage has for the most part disappeared since 1967/68. Mexico's cucumber production cost decreased from being 78 percent higher than Florida's cost in 1967/68 to being 15 percent greater than Florida costs in 1973/74 and only 7 percent greater in 1978/79.

Eggplant

Florida's cost advantage over Sinaloa in eggplant production increased to $0.25 in 1978/79 from $0.20 in 1973/74. Relative costs in the two areas, however, remained almost unchanged. Sinaloa costs were 6.2 percent higher than those for Florida in 1973/74 and 5.4 percent higher in 1978/79.

No long-term trend is apparent in relative costs. Mexico's costs for eggplant, almost 18 percent higher than Florida's in 1967/68, had become equal by 1970/71. Florida again had a cost advantage in 1973/74. The change between 1973/74 and 1978/79 is so small as to indicate substantially no change.

COSTS DELIVERED TO TERMINAL MARKETS

A further assessment of the cost competitive position of Florida and west Mexican producers was made by comparing total costs of delivery to selected major U.S. markets. Appropriate transportation costs were added to the Florida and Mexican costs to arrive at comparable costs delivered to Chicago and New York City (table 34).

Florida had cost advantages in 1978/79 in these two markets for all four vegetables studied. Furthermore, Florida's competitive position has improved since the 1973/74 season. For example, the cost advantage for delivering mature green stake-grown Florida tomatoes to Chicago during midwinter months versus costs for delivering Mexican vine-ripened tomatoes increased from a $0.31 cost disadvantage (per 30-pound carton) in 1973/74 to a $0.60 cost advantage in 1978/79. A similar change occurred for ground tomatoes, as Florida's cost advantage at Chicago changed from a $0.10 disadvantage in 1973/74 to a $0.45 advantage in 1978/79. Florida substantially improved its competitive position for peppers as a $0.52 cost disadvantage in Chicago in 1973/74 changed to a $1.09 per bushel cost advantage in 1978/79.

The change in Florida's competitive position in cucumber production was less dramatic than that for peppers, but in the same direction. Florida's cost advantage in Chicago increased from $0.77 per bushel in 1973/74 to $1.51 in 1978/79. Although Florida appears to enjoy a cost advantage in cucumber production, it is important only during the fall and spring. During the midwinter months, Mexico has a decided climatic advantage for cucumber production, and few cucumbers originate in Florida during this period. Florida's competitive position for eggplant has improved likewise as its cost advantage delivered to Chicago increased from $0.04 per bushel in 1973/74 to $0.65 in 1978/79.

Florida continues to realize its greatest advantage over Mexico in the Northeast. Because of higher transportation costs from Nogales than from south Florida points, Florida's cost advantage in the New York City market is larger than its advantage in Chicago for all four vegetables.

Prices Received in Florida and Mexico

Prices received, as well as costs to produce, contribute to determining a producer's competitive position. For example, if Mexico shipped larger volumes during periods of high prices, as might occur in the midwinter months, while Florida tended to ship smaller volumes, Mexico could have a net competitive advantage despite its higher production costs. Or, if buyers paid a premium price for vegetables from one area, that area might enjoy a competitive advantage, in spite of a cost disadvantage.

Two sets of average prices received for Mexican and Florida vegetables were calculated (table 35). The simple average shows the expected prices for Florida (f.o.b the packinghouse), and Mexican vegetables (f.o.b. Nogales) marketed during any given week of the season. The weighted-average price reflects the effect of different volume distributions on the season average price. A weighted-average price substantially higher than an area's simple average price indicates that the volume of shipments was high during weeks of high prices. In contrast, heavy volumes during periods of low prices result in a low weighted-average price.

Florida tomato prices tend to be higher than Mexican prices during any given week. The five-season simple average price for Florida tomatoes was $7.83, versus $7.53 for Mexican tomatoes. Mexico receives a higher average price for peppers than does Florida--$10.32 for Mexican peppers versus $8.86 for Florida peppers. Cucumber prices tend to be about the same in Florida and Mexico. Weekly average prices were not available for Mexican eggplant.

Table 34--Total costs of production, marketing, and delivery to Chicago and New York for fresh winter vegetables

Crop and producing area	Chicago				New York			
	1967/68 1/	1970/71 1/	1973/74 2/	1978/79 2/	1967/68 1/	1970/71 2/	1973/74 2/	1979/79 2/
	Dollars/30-lb equivalent carton							
Tomatoes:								
Florida mature greens								
Staked (winter)	--	--	6.03	6.82	--	--	6.03	6.78
Ground (winter)	--	--	5.82	6.97	--	--	5.82	6.93
Staked (spring)	--	--	--	6.17	--	--	--	6.13
Mexico vine-ripe	3.84	4.04	5.72	7.42	4.32	4.73	6.26	8.02
Difference, Mexican minus Florida staked (winter)	--	--	-.31	.60	--	--	.24	1.24
Difference, Mexican minus Florida ground (winter)	--	--	-.10	.45	--	--	.44	1.09
Difference, Mexican minus Florida staked (spring)	--	--	--	1.25	--	--	--	1.89
	Dollars/bushel							
Bell peppers:								
Florida	3.54	4.12	5.67	7.21	3.44	4.02	5.57	7.09
Mexico	5.34	5.02	5.15	8.30	5.90	5.89	5.63	8.95
Difference, Mexico minus Florida	1.80	.90	-.52	1.09	2.46	1.87	.06	1.86
Cucumbers:								
Florida	3.96	4.67	7.09	8.87	3.91	4.57	6.99	8.76
Mexico	6.32	6.34	7.86	10.02	7.01	7.37	8.64	10.99
Difference, Mexico minus Florida	2.36	1.67	.77	1.15	3.1	2.8	1.65	2.23
Eggplant:								
Florida	2.90	3.43	4.55	6.05	2.80	3.33	4.45	5.93
Mexico	3.41	3.67	4.59	6.70	3.99	4.57	5.07	7.35
Difference, Mexico minus Florida	.51	.24	.04	.65	1.19	1.24	.62	1.42

-- = Not available for this season.
1/ From [10, 15].
2/ Transportation costs based on the January-May average reported in unpublished monthly truck rates for fresh fruit and vegetables collected by Commodity Economics Division and ESCS in 1974 and 1978.

Table 35--Average f.o.b. prices received by Florida and west Mexico growers for fresh winter vegetables, 1973/74 through 1977/78

Season	Tomatoes		Peppers		Cucumbers		Eggplant	
	Florida 1/	Mexico 2/	Florida	Mexico	Florida	Mexico	Florida	Mexico 3/
	Dollars/30-lb carton		Dollars/bushel					
Simple average prices: 4/								
1973/74	--	--	5.43	6.62	8.43	8.11	--	--
1974/75	--	--	7.14	10.03	12.83	13.17	--	--
1975/76	--	--	10.58	12.53	7.99	8.08	--	--
1976/77	--	--	11.79	13.67	9.82	9.60	--	--
1977/78	--	--	9.35	8.76	13.13	12.75	--	--
Five-season average	5/ 7.83	5/ 7.53	8.86	10.32	10.44	10.34	--	--
Weighted average prices: 6/								
1973/74	--	--	6.63	5.85	6.61	7.06	4.13	5.21
1974/75	--	--	6.85	10.16	7.13	13.25	4.28	4.48
1975/76	--	--	7.82	10.71	5.83	9.07	3.38	3.83
1976/77	--	--	7.21	15.60	7.39	11.14	4.26	4.19
1977/78	--	--	8.60	8.12	7.10	10.12	3.20	4.06
Five-season average	5/ 7.30	5/ 7.13	7.42	10.09	6.81	10.13	3.85	4.35

-- = Not available for this season.
1/ Based on daily average prices for 30-pound cartons of mature green tomatoes.
2/ Based on daily average prices for 30-pound equivalent of breaker to red tomatoes.
3/ The weighted average for Mexico eggplant was based on Florida weekly prices weighted by Mexican weekly volume. This procedure was used because prices for eggplant from Mexico were not available.
4/ Calculated as simple average of all f.o.b. prices for weeks in which quotes were reported for both south Florida and Nogales.
5/ Based on daily prices reported in [1] for the period from January 1, 1978, through March 28, 1979.
6/ Calculated by average of f.o.b. prices for all weeks for which prices were reported, weighted by the volume of shipments for the respective weeks.

Sources: [1, 9].

Weighted average prices present a somewhat different picture. Mexico's weighted average prices tend to be relatively higher than Florida's. For example, whereas Florida's simple average price for tomatoes was $0.30 per 30 pounds higher than Mexico's price, the weighted average was only $0.17 per 30-pound equivalent higher for Florida tomatoes than for Mexican tomatoes.

A similar picture emerges with peppers. Although Mexico has a $1.46-per-bushel price advantage over Florida in simple average prices ($10.32 versus $8.86), the difference increases to a $2.67 advantage when considering the season weighted average. Practically all of this difference, however, is due to the 1976/77 Florida freeze which caused an exceptionally high weighted average price for Mexican peppers. If that season is excluded, the weighted average pepper prices in Florida and Mexico are $7.48 and $8.71 per bushel, respectively, a $1.23-per-bushel advantage for Mexico.

Cucumbers show the most dramatic effect of volume on average price. The simple averages for Florida and Mexico are almost the same--$10.44 per bushel for Florida and $10.34 for Mexico. But Mexico's weighted average price is $3.32 per bushel higher than Florida's weighted average. This large difference remains, even if 1976/77 is dropped, indicating that even in normal years, Mexico's heavier shipments occur during periods of higher prices.

Since prices for Mexican eggplant were not available, the Florida price was weighted by both the Florida and Mexico volumes to determine the effect of the distribution of shipments on season average price. As with the other vegetables, the Mexican weighted average was higher than the Florida figure, indicating that in general, Mexican volume was higher during the high price weeks than the Florida volume.

Net Competitive Advantage

Although Florida has a cost advantage over Sinaloa in supplying the four vegetables, it is the net of both cost advantage and price advantage that is most important. As used in this report net competitive advantage for Florida is the sum of the cost advantage and the price advantage (table 36). A positive number indicates a favorable advantage for Florida while a negative figure indicates a disadvantage for Florida. A competitive advantage for Florida means a competitive disadvantage for Mexico, and vice versa. Net competitive advantage was calculated using both the simple average price and the weighted average price; however, weighted average price appears to be more appropriate for purposes of calculating net competitive advantage.

Florida has a net competitive advantage in tomato production. Florida's net competitive advantage in winter tomatoes, using the weighted average price, is between $0.18 and $0.31 per 30-pound carton. During May and June, the net advantage is larger because Florida's production costs are lower then.

Florida growers have a net disadvantage in peppers of $0.77 per bushel using simple average prices, and a disadvantage of $1.98 per bushel using weighted-average prices. The reason for Florida's competitive disadvantage in peppers is that Mexican-produced peppers sell for higher prices. If the effects of the 1976/77 Florida freeze are removed, Mexico's weighted-average price advantage is only $1.23 and Florida's net disadvantage falls to $0.54 per bushel.

It is difficult to draw conclusions about the competitive advantage of Florida in cucumber production. Florida enjoys a net advantage when the analysis is based on simple average prices but a large disadvantage when it is based on weighted average prices. Florida and Mexico ship cucumbers at different times and prices are low during Florida's market season and high during Mexico's. Climate determines competitive advantage for cucumbers more than costs and prices. Cold weather limits Florida's cucumber shipments

Table 36--Net competitive advantage for Florida in supplying fresh winter vegetables to U.S. markets 1/

Cost component	Winter tomatoes		Spring tomatoes	Peppers	Cucumbers	Eggplant
	Staked	Ground				
	---Dollars/30-lb carton---			--------Dollars/bushel------		
Simple average prices:						
Price advantage 2/	0.30	0.30	0.30	-1.46	0.10	--
Cost advantage 3/	.16	.01	0.81	.69	.46	--
Net advantage 4/	.46	.31	1.11	-.77	.56	--
Weighted average prices:						
Price advantage 2/	.17	.17	.17	-2.67	-3.32	-0.50
Cost advantage 3/	.16	.01	.81	.69	.46	.26
Net advantage 4/	.33	.18	.98	-1.98	-2.86	-.25

-- = Data not available.
1/ A positive number represents a net competitive advantage for Florida; a negative number represents a net competitive advantage for Mexico.
2/ Calculated as Florida price minus Mexican price; five-season simple average (1972/73-1977/78).
3/ Calculated as Mexican cost minus Florida cost (1977/78 season).
4/ Sum of price advantage and cost advantage.

Source: Calculated from tables 31, 32, and 35.

during winter, whereas Mexican producers have quality problems in producing cucumbers early in the season and late in the spring.

Mexico appears to have a slight net advantage for eggplants. However, the weighted average price advantage for eggplant was calculated using Florida price data. If Mexican price data were available, a different competitive picture could emerge for eggplant.

CONCLUSIONS

Mexico has made major advances in increasing its share of the U.S. winter fresh vegetable market since 1967. Although trends since 1973/74 are not clear, the evidence indicates a strengthening of Florida's competitive position, particularly in fresh tomatoes. The Florida industry made a substantial recovery between 1973 and 1976. Devaluation of the peso and adverse weather, however, interrupted Florida's recovery and left future changes in relative market share for the two production areas unclear.

The peso devaluation in August 1976 provided temporary relief to Mexican vegetable growers from input price inflation, in dollar terms, relative to Florida. Florida input prices increased, on the average, about 46 percent between 1974 and 1978. Mexico's input cost rose about 23 percent, in dollar value, during the same period. The relief for the Mexican vegetable growers, however, appears to have been temporary. Agricultural wages, a major cost item in vegetable production for both Florida and Mexico, have risen faster in Mexico than in Florida. It also appears likely that continuing inflation will affect Mexican growers more than Florida growers in the years ahead, since inflation rates tend to be higher in Mexico than in Florida.

The prospects are favorable that Florida will strengthen its cost competitive position relative to Mexico, because of the higher internal rate of inflation in Mexico than in the United States and because of rising labor costs. The source of much of west Mexico's competitive strength in the past has been its very low labor costs. The rural wage in Mexico generally has been one-sixth to one-fourth that paid to Florida farmworkers. Over the past five seasons, wage inflation has been 5 to 10 percent in Florida versus 15 to 20 percent in Mexico. 13/ The 1976 devaluation caused Mexican wages to drop, in dollar terms, but since then the agricultural wage in Mexico increased at a faster rate than in Florida. In 1979, the Mexican wage was about one-fifth the Florida wage. Although the 1976 devaluation gave Mexican growers a temporary reprieve from rising prices (in dollar value), continuing inflation appears more and more to be eroding the cost competitive strength of the Mexican winter fresh vegetable industry.

Tariffs are an important cost item in exporting vegetables to the United States and provide the margin that gives Florida a cost advantage in tomatoes, peppers, cucumbers, and eggplant. Any major reduction in the tariff on vegetables would immediately shift the cost advantage in winter fresh vegetables in Mexico's favor, at the expense of Florida's producers. Such a change, however, would lower the prices charged to U.S. consumers.

If the Mexican Government were to reduce its inflation rate, relative to the U.S. rate, the trend of the past several years, in which Mexico's costs have been rising faster than costs in Florida, could be reversed. Such a development probably would lead to a strengthening of Mexico's cost competitive position relative to Florida's, with Mexico gradually expanding its share of the U.S. market.

Inexpensive land is not a source of lower costs for vegetable production in western Mexico than in Florida. Agricultural land rentals in Sinaloa are similar to those for Dade and Palm Beach Counties, but higher than those for the southwest Florida and Manatee-Ruskin areas. Many alternative high-value uses are available for cropland in Sinaloa, thereby creating high land rentals. The Dade and Palm Beach County areas, too, have many uses for agricultural land (including industrial, commercial, and residential development) that cause land rents to be high. The southwest Florida and Manatee-Ruskin areas have fewer high-value uses competing for agricultural land, hence land rentals for vegetables are lower in these areas than in the other areas.

Lower wages do provide Mexican vegetable growers a source of lower costs than Florida growers. Although Mexican growers pay only about one-fifth the daily wage for agricultural labor that Florida growers pay, Mexican growers use more labor, and their labor cost per unit of production is roughly half that of Florida's. Mexican vegetable producers probably will adopt production practices that raise labor productivity, such as harvesting more tomatoes as mature greens, if the Mexican wage rate continues its rapid rise of recent years.

The use of plastic mulch dramatically increased yields in Florida tomato, pepper, and eggplant production over the past five seasons. Plastic mulch appears to hold the same yield-increasing advantages for Mexican vegetable growers that it brought to Florida producers. The Mexican producers, for one reason or another, have not yet adopted plastic mulch in vegetable production. Increasing wage rates and rising land and water costs in the years ahead could make plastic mulch a profitable production practice in Mexico, too. Its adoption probably would increase Mexico's vegetable yields as it did for Florida growers.

13/ The exception was between 1976 and 1977, when the Mexican rural wage increased 36 percent following devaluation.

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APPENDIX--ESTIMATING COSTS OF PRODUCTION IN FLORIDA AND SINALOA

Cost estimates for producing and marketing tomatoes, peppers, cucumbers, and eggplants were developed in the fall of 1978 for Florida and Sinaloa in western Mexico. Similar estimating procedures were used in both regions, so the estimates would be comparable. Costs were based on prices and production techniques selected as typical for the 1978/79 season. Total costs included all expenses f.o.b. the shipping points in south Florida, and f.o.b. Nogales, Ariz., in the case of Sinaloa.

The costs used were those that an average or better-than-average manager would incur in a typical year. Some growers, of course, have higher costs, while others have lower costs. In addition, costs in any one year may be unusually high, or low, due to unique growing conditions, market conditions, unusual insect or disease problems, or other factors occurring during that season.

No cost estimate serves all purposes for which costs may be needed. Each use requires a unique estimate. For example, shortrun costs, which a grower might compare against receipts in deciding whether to harvest during periods of low prices, would be different from the accounting costs he would use to calculate net returns at the end of the season. Accounting costs, in turn, may be different from those a grower uses in planning to decide whether to produce tomatoes or some other crop. Cost estimates in this study are longrun total costs, and are appropriate for comparing the cost competitive position of two production areas such as Florida and Mexico. They may be higher than costs developed for other purposes, in that they consist of all costs, including an imputed value for returns on equity capital and on other owned resources.

Procedures

A budgeting technique was used for estimating costs. The budget specifies typical amounts of inputs and services such as fertilizer, seeds, pesticides, machinery hours, and man-hours. The amounts and kinds of specific pesticides and fertilizer materials specified in the budgets were selected to represent typical costs. Representative prices are multiplied by the amount of each input to arrive at costs for that item. Labor costs are estimated by multiplying total hours of labor by labor cost per hour (wages plus fringe benefits). Machinery costs are calculated in a similar way by multiplying hours of use by hourly costs (ownership and operating costs). In addition, overhead charges (administrative expenses) were apportioned to each budget for the crop's share of general expenses associated with operation of the firm.

Definitions of Terms

Preharvest costs include all expenses such as fertilizer, pesticides, seed, labor and machine services, land rental, administrative costs, and interest on operating capital used in raising the crop to the harvest stage. In most cases, the costs are sunk or fixed by the time the crop is harvested. Although the grower needs to recoup all his costs to break even, he generally views preharvest costs as fixed in making the harvesting decision.

Harvesting costs include picking costs and expenses associated with hauling the produce to the packing shed. These may sometimes be considered as variable costs at harvest time. The grower's expected market price must be at least high enough to cover picking costs plus packing and selling costs if the crop is to be harvested profitably. Early in the season, a grower may consider it necessary to pick the fruit in order to allow further fruit to set in case the price improves later in the season. In such a situation, picking costs could be considered fixed.

Packing cost includes all expenses for grading and packing. It, too, is generally considered a variable cost in making the harvesting decision.

Selling cost is the commission paid to a salesman who finds a buyer for the produce. This, too, is generally considered a variable cost in making the harvesting decision.

Administrative expenses represent the crop's share of overhead costs such as telephone, secretarial and bookkeeping expenses, salaries of corporate officers, administrative vehicles, organizational fees and dues, travel expenses, and other miscellaneous expenses that cannot be directly allocated to the crop. Preharvest administrative expenses were estimated as 4.5 percent of noninterest costs. No administrative costs were charged against harvesting.

Land rental is the charge for use of the land, and it was based on the current typical charges for land leased for vegetables. It was assumed that the landlord paid the property taxes, drainage district taxes, and any other fixed landownership costs. Capital costs for permanent irrigation facilities such as wells and canals were assumed, also, to be incurred by the landlord. Costs for maintaining these facilities during the current crop year were included in preharvest costs.

Interest on operating capital was the charge for use of operating capital. It was calculated at the rate of 9 percent per year for 4 to 6 months, depending upon the type of crop grown.

Florida Cost Estimates

Budgets are presented here for three tomato-producing areas, two pepper-producing areas, and one cucumber and one eggplant area. Each itemized budget is followed immediately by the labor and machinery use documentation and a working table used to estimate machinery costs. Appendix table 22, documenting hourly machinery costs, is presented at the end of the Florida budgets.

The technical coefficients (such as crop yield, and related quantities of labor, machine services, and materials used, etc.) were selected to be typical of progressive producers. Estimates were based on discussions with growers, State extension service and research specialists, and others familiar with the particular crop, as well as on secondary data sources. Estimates of representative prices were based on discussions with growers and input suppliers.

Appendix table 1--Mature green ground tomatoes: costs for producing and marketing in Dade County, Fla., 1978/79

Cost item	Description	Cost
		Dollars/acre
Preharvest:		
Clean out old wells	Custom hire	15.00
Propane gas	35 gallons @ 47¢/gallon	16.45
Cricket bait	40 pounds @ 20¢/pound	8.00
Fertilizer	2,000 pounds 8-16-16 with trace elements @ $160.00/ton	160.00
	500 pounds 2-20-4 @ $120/ton	30.00
Soil fumigant	200 pounds MC-33 @ 70¢/pound	140.00
Plastic	3 rolls @ $56.00/roll	168.00
Seed	1/4 pound @ $25.00/pound	6.25
Plug mix	4 6-cubic feet bags @ $7.50/bag	30.00
Herbicide	3 pints Paraquat @ $36/gallon	13.50
Insecticide	20 pounds Thiodan @ $3.10/pound	62.00
	10 pounds Dipel @ $7.55/pound	75.50
	9 quarts Lannate @ $16/gallon	36.00
	20 pints Monitor @ $35/gallon	87.50
	1 gallon Sticker @ $17/gallon	17.00
Fungicide	33 pounds Maneb @ $1.30/pound	42.90
	30 pounds Copper @ $1.50/pound	45.00
	7 pints Bravo @ $26/gallon	22.75
	2 pounds Streptomycin @ $5/pound	10.00
	2 pounds Benlate @ $9.10/pound	18.20
Tractor labor	16.54 hours @ $4.58/hour	75.75
Other cultural labor	67.73 hours @ $3.54/hour	239.76
Supervisory labor	20 hours @ $6.10/hour	122.00
Machinery costs	Ownership	101.08
	Operating	125.94
Land rental	$90 per acre	90.00
Administrative costs	Labor	47.48
	Other	31.65
Interest on operating capital 1/	$1,780.56 @ 9 percent for 5 months	65.12
Total preharvest		1,902.83
Average yield: 675 30-pound cartons		Dollars/30-lb carton
Total preharvest		2.82
Harvest:		
Picking labor	$0.65 + 22% benefits	.79
Hauling		.13
Total harvest		.92

Continued--

Appendix table 1--Mature green ground tomatoes: costs for producing and marketing in Dade County, Fla., 1978/79 --Continued

Cost item	Description	Cost
		Dollars/30-lb carton
Packing and marketing:		
Labor	Hourly labor	0.48
Machinery, equipment, buildings	Ownership	.29
	Operation	.10
Pallets		.21
Boxes	60¢ each	.60
Miscellaneous supplies		.07
Administrative	Labor	.06
	Other	.04
Selling costs		.15
Total packing and marketing		2.00
Total costs		5.74

1/ Interest on machinery and equipment investment is included in machinery ownership costs.

Appendix table 2--Mature green tomatoes: hours of equipment and labor required to perform each operation for growing in Dade County, Fla., 1978/79

Operation	Equipment used	Times over	Hourly requirements per acre				
			Equipment	Tractor (60 hp)	Tractor (110 hp)	Tractor labor	Other labor
		Number	Hours				
Land preparation:							
Burn old plastic	L.P. gas burner	1	0.4	0.40	N.A.	0.50	N.A.
Fallow disking	13 foot disk	8	1.28	N.A.	1.28	1.60	N.A.
Preplant disking	13 foot disk	2	.32	N.A.	.32	.40	N.A.
Mark off and form beds	3-row bedder disk rig	2	.25	N.A.	.25	.31	N.A.
Press beds	3-row bed press	1	.33	N.A.	.33	.41	N.A.
Apply fertilizer	3-row fertilizer rig	1	.33	.33	N.A.	.41	0.41
	Fertilizer tender	1	.33	.33	N.A.	.41	N.A.
Fumigate and lay plastic	3-row fumigation and plastic layer rig	1	.33	.33	N.A.	.41	.82
Prepare plug mix	Mixer	1	0.3	N.A.	N.A.	.40	N.A.
Cultivation:							
Plant	3-row planter rig	1	.60	.60	N.A.	.75	1.50
Apply herbicide	2-row herbicide sprayer	3	1.5	1.50	N.A.	1.88	N.A.
Spray	5-row pull type sprayer	29	7.25	7.25	N.A.	9.06	N.A.
Thin plants	Hand labor	1	N.A.	N.A.	N.A.	N.A.	30.00
Irrigate	100 horsepower pump mounted on 2.5 ton truck	1/ 16	12.0	N.A.	N.A.	N.A.	15.00
Other cultural labor	Hand labor	N.A.	N.A.	N.A.	N.A.	N.A.	20.00
Total				10.74	2.18	16.54	67.73

N.A. = not applicable.
1/ Five times following planting with one-fourth inch per application; 11 applications during growing season at 1 inch per application.

Appendix table 3--Mature green ground tomatoes: machinery and equipment costs per acre in Dade County, Fla., 1978/79

Item	Time used	Cost per hour		Total cost	
		Ownership	Operation	Ownership	Operation
	Hours	Dollars			
L.P. gas burner	0.40	3.00	2.00	1.20	0.80
13-foot disk	1.60	4.42	4.42	7.07	7.07
Bedder disk rig (3 rows)	.25	3.91	1.41	.98	.35
Bed press (3 rows)	.33	9.60	1.92	3.17	.63
3-row fertilizer rig	.33	9.60	5.60	3.17	1.85
Fertilizer tender	.33	3.67	3.50	1.21	1.16
Fumigation rig and plastic layer	.33	7.50	2.40	2.48	.79
Mixer	.30	2.10	1.20	.63	.36
3-row planter	.60	7.85	6.25	4.71	3.75
Herbicide sprayer (2 rows)	1.50	.83	.62	1.25	.93
Boom sprayer	7.25	4.08	3.40	29.58	24.65
100-horsepower pump	12.00	1.87	3.76	22.44	45.12
60-horsepower tractor	10.74	1.50	2.55	16.11	27.39
110-horsepower tractor	2.18	3.25	5.09	7.08	11.09
Total	N.A.	N.A.	N.A.	101.08	125.94

N.A. = not applicable.

Appendix table 4--Mature green staked tomatoes: costs for producing and marketing in southwest Florida, 1978/79

Item	Description	Cost
		Dollars/acre
Preharvest:		
Clean ditches	Custom hire	35.00
Level land	Custom hire	15.00
Propane gas	55 gallons @ 47¢/gallon	25.85
Lime	1/2 ton lime @ $12/ton	6.00
	1/2 ton dolomite @ $15/ton	7.50
Fumigant	18 gallons Vorlex @ $9.60/gallon	172.80
Plastic	3 rolls @ $60/roll	180.00
Fertilizer	1,500 pounds 4-14-4 @ $115/ton	86.25
	1,500 pounds 18-0-25 @ $172/ton	129.00
	30 pounds trace elements @ 20¢/pound	6.00
Plants	6,000 1-1/2" x 1-1/2" transplants @ 2.7¢ each	162.00
Poison bait	40 pounds @ 20¢/pound	8.00
Replacement stakes	1,500 @ $120.00/1,000	180.00
Plastic string	40 pounds @ 80¢/pound	32.00
Herbicide	3 pints Paraquat @ $36/gallon	13.50
Insecticide	20 pounds Thiodan @ $3.10/pound	62.00
	12.5 pounds Dipel @ $7.55/pound	94.38
	5 quarts Monitor @ $35/gallon	43.75
	5 quarts Lannate @ $16.50/gallon	20.62
	1 gallon Sticker @ $17/gallon	17.00
Fungicide	30 pounds Maneb @ $1.30/pound	39.00
	30 pounds Copper @ $1.50/pound	45.00
	5 pints Bravo @ $26/gallon	16.25
	2 pounds Streptomycin @ $5/pound	10.00
	2 pounds Benlate @ $9.10/pound	18.20
Tractor labor	33.05 hours @ $4.58/hour	151.37
Other cultural labor	127.75 hours @ $3.54/hour	452.24
Supervisory labor	20 hours @ $6.10/hour	122.00
Machinery costs	Ownership	131.31
	Operating	179.77
Land rental		42.50
Administrative costs	Labor	67.62
	Other	45.08
Interest on operating capital 1/	$2,485.69 @ 9 percent for 5 months	93.21
Total preharvest		2,710.20
Average yield per acre:	950 30-pound cartons	Dollars/30-lb carton
Total preharvest		2.85

Continued--

Appendix table 4--Mature green staked tomatoes: costs for producing and marketing in southwest Florida, 1978/79--Continued

Item	Description	Cost
		Dollars/30-lb carton
Harvest:		
Picking labor	$21/pallet, 27-carton pack out	.78
Hauling	$3/pallet, 27-carton pack out	.11
Total harvest		.89
Packing and marketing:		
Labor	Hourly labor	.43
Machinery, equipment, buildings	Ownership	.25
	Operation	.08
Pallets		.19
Boxes	60¢ each	.60
Miscellaneous supplies	Chlorine, wax, etc.	.07
Administrative	Labor	.05
	Other	.03
Selling costs	15¢/carton	.15
Total packing and marketing		1.85
Total costs		5.59

1/ Interest on machinery and equipment investment is included in machinery ownership costs.

Appendix table 5--Mature green staked tomatoes: hours of equipment and labor required to perform each operation for growing in southwest Florida, 1978/79

Operation	Equipment used	Times over	Hourly requirements per acre				
			Equipment	Tractor (60 hp)	Tractor (110 hp)	Tractor labor	Other labor
		Number	Hours				
Land preparation:							
Burn residue and old crop	L.P gas burner	1	0.40	0.40	N.A.	0.50	N.A.
Remove and stack stakes	Stake rack	1	2.00	2.00	N.A.	2.50	10.00
Destroy old plants	Rotary mower	1	.60	N.A.	.6	.75	N.A.
Remove old plastic	Hand labor	1	N.A.	N.A.	N.A.	N.A.	15.00
Disk	11-foot disk	5	2.00	N.A.	2.0	2.50	N.A.
Mark off beds	Tractor alone	1	N.A.	.60	N.A.	.75	N.A.
Apply fertilizer	Fertilizer attachment	2	1.60	1.60	N.A.	2.00	N.A.
	Fertilizer tender	2	1.60	1.60	N.A.	2.00	N.A.
Throw beds, fumigate, and press beds	Bedder disk assembly	1	1.00	N.A.	1.0	1.25	1.25
	Bed press	1	1.00	N.A.	N.A.	N.A.	N.A.
	Fumigation rig	1	1.00	N.A.	N.A.	N.A.	N.A.
Lay plastic	Plastic layer	1	1.00	1.00	N.A.	1.25	2.50
Cultivation:							
Setting plants	Transplanter	1	2.40	2.40	N.A.	3.00	9.00
Set stakes	Stake rack	1	.90	.90	N.A.	1.12	4.50
Drive stakes	Stake driver set	1	.90	.90	N.A.	1.12	4.50
Spray herbicides to row middles	2-row sprayer	2	1.00	1.00	N.A.	1.25	N.A.
Tie plants (3 times)	Hand labor						18.00
Spray plants (25 times)	Boom sprayer	25	6.25	6.25	N.A.	7.81	
Irrigation	Pump and 100 horsepower diesel engine	N.A.	15.00	N.A.	N.A.	N.A.	5.00
Water plants	Water wagon	10	3.2	3.20	N.A.	4.00	N.A.
Prune plants (2 times)	Hand labor	2	N.A.	N.A.	N.A.	N.A.	30.00
Cut cross ditches	Ditcher	1	1.0	1.00	N.A.	1.25	3.00
Other hand labor 1/	Hand labor	N.A.	N.A.	N.A.	N.A.	N.A.	25.00
Total		N.A.	N.A.	22.85	3.6	33.05	127.75

N.A. = not applicable.
1/ Resetting plants, applying insect bait, and numerous routine and emergency chores that are part of the growing operation.

Appendix table 6--Mature green staked tomatoes: machinery and equipment costs per acre in southwest Florida, 1978/79

Item	Time used	Cost per hour		Total cost	
		Ownership	Operation	Ownership	Operation
	Hours	Dollars			
Rotary mower	0.60	1.48	0.90	0.89	0.54
L.P. gas burner	.40	3.00	2.00	1.20	.80
Stake rack	2.90	.33	.15	.96	.44
Disk, 11-foot	2.00	3.00	2.40	6.00	4.80
Fertilizer attachment	1.60	3.55	3.21	5.68	5.14
Bedder disk assembly	1.00	.81	.64	.81	.64
Bed press	1.00	.48	.32	.48	.32
Fumigation rig	1.00	1.38	1.10	1.38	1.10
Plastic layer	1.00	.52	.42	.52	.42
Transplanter	2.40	.50	.39	1.20	.94
Stake driver set	.90	2.12	1.71	1.91	1.54
2-row sprayer	1.00	.83	.62	.83	.62
Boom sprayer	6.25	4.08	3.40	25.50	21.25
Pump and 100-horsepower engine	15.00	1.87	3.76	28.05	56.40
Water wagon	3.20	1.00	.67	3.20	2.14
Ditcher	1.00	.86	.49	.86	.49
60-horsepower tractor	22.85	1.50	2.55	34.27	58.27
110-horsepower tractor	3.60	3.25	5.09	11.70	18.32
Fertilizer tender	1.60	3.67	3.50	5.87	5.60
Total	N.A.	N.A.	N.A.	131.31	179.77

N.A. = not applicable.

Appendix table 7--Mature green staked tomatoes (spring crop): costs for producing and marketing in the Manatee-Ruskin area, Fla., 1978/79

Item	Description	Cost
		Dollars/acre
Preharvest:		
PVC pipe	$140/acre amortized over 5 years @ 8%	35.06
Propane gas	35 gallons @ 47¢/gallon	16.45
Cricket bait	40 pounds @ 20¢/pound	8.00
Lime	2 tons lime @ $12/ton	24.00
	1.5 tons dolomite @ $15/ton	22.50
Fumigant	95 pounds MC-33 @ 70¢/pound	66.50
Plastic	1.8 rolls @ $50/roll	90.00
Fertilizer	1,000 pounds 4-13-8 @ $116/ton	58.00
	2,000 pounds 10-3-20 @ $148/ton	148.00
	30 pounds trace elements @ 20¢/pound	6.00
Plants	2,500 2"x2" transplants @ 3.7¢ each	92.50
Replacement stakes	300 @ $120/1,000	36.00
Plastic string	20 pounds @ 75¢/pound	15.00
Herbicide	2 pints Paraquat @ $36/gallon	9.00
Insecticide	20 pounds Thiodan @ $3.10/pound	62.00
	11 pounds Dipel @ $7.55/pound	83.05
	2 quarts Lannate @ $16.50/gallon	8.25
	6 pints Monitor @ $35/gallon	26.25
Fungicide	33 pounds Maneb @ $1.30/pound	42.90
	5.5 pints Bravo @ $26/gallon	17.88
	22 pounds Copper @ $1.50/pound	33.00
	2 pounds Benlate @ $9.10/pound	18.20
	2 pounds Streptomycin @ $5/pound	10.00
Tractor labor	23.07 hours @ $4.58/hour	105.66
Other cultural labor	86.42 hours @ $3.54/hour	305.92
Supervisory labor	20 hours @ $6.10/hour	122.00
Machinery costs	Ownership	92.77
	Operation	120.50
Land rental	$50 per acre	50.00
Administrative costs	Labor	46.59
Interest on operating capital 1/	$1,710.26 @ 9 percent for 5 months	64.13
Total preharvest		1,867.16
Average yield per acre:	825 30-pound cartons	Dollars/30-lb carton
Total preharvest		2.26
Harvest:		
Picking and hauling	2.2¢ per pound field run. 80% pack out assumed = 2.75¢/pound pack out	.83
Total harvest		.83

Continued--

Appendix table 7--Mature green staked tomatoes (spring crop): costs for producing and marketing in the Manatee-Ruskin area, Fla., 1978/79 --Continued

Item	Description	Cost
		Dollars/30-lb carton
Packing and marketing:		
Labor	Hourly labor	0.43
Machinery, equipment and buildings	Ownership	.25
	Operation	.08
Pallets		.19
Boxes	60¢ each	.60
Miscellaneous supplies		.07
Administrative	Labor	.05
	Other	.03
Selling costs		.15
Total packing and marketing		1.85
Total costs		4.94

1/ Interest on machinery and equipment investment is included in machinery ownership costs.

Appendix table 8--Mature green staked tomatoes: hours of equipment and labor required to perform each operation for growing in the Manatee-Ruskin area, Fla., 1978/79

Operation	Equipment used	Times over	Hourly requirements per acre				
			Equipment	Tractor (60 hp)	Tractor (110 hp)	Tractor labor	Other labor
		Number	Hours				
Land preparation:							
Destroy plants	Boom sprayer	1	0.20	0.20	N.A.	0.25	N.A.
Burn residue and old crop	LP gas burner	1	.40	.40	N.A.	.50	N.A.
Remove old plastic	Hand labor	1	N.A.	N.A.	N.A.	N.A.	9.00
Remove and stack stakes	Stake wagon	1	.50	.50	N.A.	N.A.	8.00
Rotovate	80-inch rotovator	1	.80	N.A.	.80	1.00	N.A.
Disk	Disk, 11 foot heavy duty	3	1.20	N.A.	1.20	1.50	N.A.
Level land	Land leveler	1	.50	.50	N.A.	.60	N.A.
Make ditches	Ditch plow	1	1.20	1.20	N.A.	1.50	N.A.
Mark off fields, make initial beds	Bedder disk assembly	1	.60	.60	N.A.	.75	.75
Apply starter fertilizer and minor elements	Fertilizer attachment	1	.30	.30	N.A.	.37	N.A.
	Fertilizer tender	1	.30	.30	N.A.	.37	2.37
Press beds, apply banded fertilizer, and fumigate	Bed press	1	N.A.	N.A.	1.30	1.60	1.60
	(Fertilizer attachment						
	Fumigant applicator)	1	1.30	N.A.	N.A.	N.A.	N.A.
Lay plastic	Plastic layer (1 row)	1	.60	.60	N.A.	.75	1.50
Cultivation:							
Setting plants	Transplanter	1	1.00	1.00	N.A.	1.20	2.40
Set stakes	Stake rack	1	.50	.50	N.A.	.60	2.40
Drive stakes	Stake driver set	1	.50	.50	N.A.	.60	2.40
Spray herbicide	2-row sprayer	2	.80	.80	N.A.	1.00	N.A.
Tie plants (4 times)		4	N.A.	N.A.	N.A.	N.A.	16.00
Clean ditches	Ditch plow	4	1.60	1.60	N.A.	2.00	N.A.
Spray plants (22 times)	Boom sprayer	22	5.50	5.50	N.A.	6.88	N.A.
Irrigation	60-horsepower diesel engine and pump	N.A.	11.00	N.A.	N.A.	N.A.	7.00
Prune plants	Hand labor	1	N.A.	N.A.	N.A.	N.A.	15.00
Other cultural labor	Hand labor	N.A.	N.A.	N.A.	N.A.	N.A.	18.00
Total		N.A.	N.A.	15.80	3.30	23.07	86.42

N.A. = not applicable.

Appendix table 9--Mature green staked tomatoes: machinery and equipment costs per acre in the Manatee-Ruskin area, Fla., 1978/79

Item	Time used	Cost per hour		Total cost	
		Ownership	Operation	Ownership	Operation
	Hours	Dollars			
L.P. gas burner	0.40	3.00	2.00	1.20	0.80
80-inch rotovator	.80	3.00	2.40	2.40	1.92
11 foot disk	1.20	3.00	2.40	3.60	2.88
Land leveler	.5	2.85	.81	1.43	.41
Ditch plow	2.80	.38	.25	1.06	.70
Bedder disk assembly	.60	.81	.64	.49	.38
Fertilizer attachment	1.60	3.55	3.21	5.68	5.14
Transplanter	1.00	.50	.39	.50	.39
Stake wagon	1.00	.33	.15	.33	.15
Stake driver set	.50	2.12	1.71	1.06	.86
Bed press	1.30	.48	.32	.62	.42
Fumigant applicator	1.30	1.38	1.10	1.79	1.43
Plastic layer (1 row)	.60	.52	.42	.31	.25
Boom sprayer	5.50	4.08	3.40	22.44	18.70
60-horsepower diesel and pump	11.00	.81	2.08	8.91	22.88
2-row sprayer	.80	.83	.62	.66	.50
60-horsepower tractor	15.80	1.50	2.55	23.70	40.29
110-horsepower tractor	3.30	3.25	5.09	10.72	16.80
Fertilizer tender	1.60	3.67	3.50	5.87	5.60
Total	N.A.	N.A.	N.A.	92.77	120.50

N.A. = not applicable.

Appendix table 10--Green peppers: costs for producing and marketing in Palm Beach County, Fla., 1978/79

Cost item	Description	Cost
		Dollars/acre
Preharvest:		
Clean ditches	Custom hire	35.00
Grade fields	Custom hire	15.00
Fumigant	15 gallons Vorlex @ $9.60/gallon	144.00
Lime	1 ton dolomite @ $22/ton	22.00
Fertilizer	500 pounds Superphosphate @ $60/ton	15.00
	500 pounds 3-15-3 @ $115/ton	28.75
	1,500 pounds 18-0-23 @ $190/ton	142.50
	30 pounds trace elements @ 20¢/pound	6.00
Plastic	3 rolls @ $60/roll	180.00
Seed	1.5 pounds @ $30/pound	45.00
Cricket bait	30 pounds @ 20¢/pound	6.00
Plug mix	15 4-cubic foot bags @ $5/bag	75.00
Herbicide	3 pints Paraquat @ $36/gallon	13.50
Fungicide	30 pounds Maneb @ $1.30/pound	39.00
	40 pounds Copper @ $1.50/pound	60.00
Insecticide	2.5 gallons Lannate @ $16.50/gallon	41.25
	2 pounds Acephate @ $5.95/pound	11.90
	30 quarts oil @ $4.50/gallon	33.75
Tractor labor	28.92 hours @ $4.58/hour	132.45
Other cultural labor	108 hours @ $3.54/hour	382.32
Supervisory labor	20 hours @ $6.10/hour	122.00
Machinery costs	Ownership	115.64
	Operating	152.52
Land rental		95.00
Administrative costs	Labor	51.67
	Other	34.44
Interest on operating capital 1/	$1,884.05 @ 9 percent for 5 months	70.65
Total preharvest		2,070.34
Average yield:	725 bushels per acre	Dollars/bushel
Average cost		2.86
Harvest, packing, and marketing:		
Harvest and packing labor	0.2 hours @ $3.72/hour	0.74
Boxes	60¢ each	.60
Machinery costs	Ownership	.03
	Operating	.04
Transportation	15¢/bushel	.15
Broker's fee	25¢/bushel	.25
Total harvesting, packing, and marketing		1.81
Total costs		4.67

1/ Interest on machinery and equipment investment is included in machinery ownership costs.

Appendix table 11--Green peppers: hours of equipment and labor required to perform each operation for growing in Palm Beach County, Fla., 1978/79

Operation	Equipment used	Times over	Hourly requirements per acre				
			Equipment	Tractor (60 hp)	Tractor (110 hp)	Tractor labor	Other labor
		Number	Hours				
Land preparation:							
Destroy old plants	Rotary mower	1	0.60	N.A.	0.60	0.75	N.A.
Pull plastic	Hand labor	1	N.A.	N.A.	N.A.	N.A.	15.00
Disk	11-foot disk	8	2.50	N.A.	2.50	3.12	N.A.
Press beds	Bed press	1	.80	N.A.	.80	1.00	N.A.
Apply fertilizer	Fertilizer spreader	3	2.40	2.40	N.A.	3.00	N.A.
	Fertilizer tender	3	2.40	2.40	N.A.	3.00	N.A.
Cut cross ditches	Ditcher	1	1.00	1.00	N.A.	1.25	2.50
Fumigate	Fumigation rig	1	1.00	1.00	N.A.	1.25	1.25
Lay plastic	Plastic layer	1	1.00	1.00	N.A.	1.25	2.50
Prepare plug mix	Mixer	1	.20	N.A.	N.A.	N.A.	.50
Punch holes	Hole puncher	1	.60	.60	N.A.	.75	N.A.
Cultivation:							
Plant	Mechanical planter	1	1.00	1.00	N.A.	1.25	1.25
Water	Water wagon	12	3.84	3.84	N.A.	4.80	N.A.
Apply herbicides	Paraquat sprayer	2	1.00	1.00	N.A.	1.25	N.A.
Spray	5-row sprayer	20	5.00	5.00	N.A.	6.25	N.A.
Water control	100 horsepower pump	N.A.	10.00	N.A.	N.A.	N.A.	30.00
Weed and thin	Hand labor	2	N.A.	N.A.	N.A.	N.A.	30.00
Other hand labor	Hand labor	N.A.	N.A.	N.A.	N.A.	N.A.	25.00
Total				19.24	3.90	28.92	108.00

N.A. = not applicable.

Appendix table 12--Green peppers: machinery and equipment costs per acre in Palm Beach County, Fla., 1978/79

Item	Time used	Cost per hour		Total cost	
		Ownership	Operation	Ownership	Operation
	Hours	Dollars			
Rotary mower	0.60	1.48	0.90	0.89	0.54
11-foot disc	2.50	3.00	2.40	7.50	6.00
Bed press	.80	.48	.32	.38	.26
Fertilizer spreader	2.40	3.55	3.21	8.52	7.70
Ditcher	1.00	.86	.49	.86	.49
Fumigation rig	1.00	1.38	1.10	1.38	1.10
Plastic layer	1.00	.52	.42	.52	.42
Mixer	.20	2.10	1.20	.42	.24
Hole puncher	.60	.42	.24	.25	.14
Mechanical puncher	1.00	.80	.53	.80	.53
Water wagon	3.84	1.00	.67	3.84	2.57
2-row sprayer	1.00	.83	.62	.83	.62
5-row sprayer	5.00	4.08	3.40	20.40	17.00
60-horsepower tractor	19.24	1.50	2.55	28.86	49.06
110-horsepower tractor	3.90	3.25	5.09	12.68	19.85
100-horsepower pump	10.00	1.87	3.76	18.70	37.60
Fertilizer tender	2.40	3.67	3.50	8.81	8.40
Total	N.A.	N.A.	N.A.	115.64	152.52

N.A. = not applicable.

Appendix table 13--Green peppers: costs for producing and marketing in southwest Florida, 1978/79

Cost item	Description	Cost
		Dollars/acre
Preharvest:		
Clean ditches	Custom hire	35.00
Land leveling	Custom hire	15.00
Fumigant	18 gallons Vorlex @ $9.60/gallon	172.80
Lime	1 ton dolomite @ $18/ton	18.00
Fertilizer	1,300 pounds 4-14-4 @ $115/ton	74.75
	1,300 pounds 18-0-25 @ $172/ton	111.80
	30 pounds trace elements @ 20¢/pound	6.00
Plastic	3 rolls @ $60/roll	180.00
Seed	1.5 pounds @ $30/pound	45.00
Plug mix	15 4-cubic foot bags @ $5/bag	75.00
Cricket bait	30 pounds @ 20¢/pound	6.00
Herbicide	2 pints Paraquat @ $36/gallon	9.00
Fungicide	30 pounds Maneb @ $1.30/pound	39.00
	40 pounds Copper @ $1.50/pound	60.00
Insecticide	5 gallons Methonyl @ $16.50/gallon	82.50
	2.5 pounds Cygon @ $18.50 gallon	46.25
Tractor labor	26.25 hours @ $4.58/hour	120.22
Other cultural labor	83 hours @ $3.54/hour	293.82
Supervisory labor	20 hours @ $6.10/hour	122.00
Machinery costs	Ownership	109.29
	Operating	152.47
Land rental		40.00
Administrative costs	Labor	48.92
	Other	32.65
Interest on operating capital 1/	$1,786.18 @ 9 percent for 5 months	66.99
Total preharvest		1,962.47
Yield per acre: 650 bushels		Dollars/bushel
Total preharvest		3.02
Harvest:		
Picking	$12/pallet, 15-bushel pack out	.80
Hauling	$3.50/pallet, 15-bushel pack out	.23
Total harvesting		1.03
Packing and marketing:		
Labor		.40
Machinery & equipment cost	Ownership	.22
	Operation	.07
Pallets		.17
Boxes	60¢/each	.60

Continued--

Appendix table 13--Green peppers: costs for producing and marketing in southwest Florida, 1978/79--Continued

Cost item	Description	Cost
		Dollars/bushel
Packing and marketing--cont.		
Miscellaneous supplies	Wax, chlorine, etc.	.06
Administrative	Labor	.05
	Other	.03
Selling cost	20¢/bushel	.20
Total packing and marketing		1.80
Total		5.85

1/ Interest on machinery and equipment investment is included in machinery ownership costs.

Appendix table 14--Green peppers: hours of equipment and labor required to perform each opeartion in growing in southwest Florida, 1978/79

Operation	Equipment used	Times used	Hourly requirements per acre				
			Equipment	Tractor (60 hp)	Tractor (110 hp)	Tractor labor	Other labor
		Number	Hours				
Land preparation:							
Destroy old plants	Rotary mower	1	0.60	N.A.	0.6	0.75	N.A.
Pull plastic	Hand labor	1	N.A.	N.A.	N.A.	N.A.	15.00
Disk	11-foot disk	5	1.56	N.A.	1.56	1.95	N.A.
Mark off beds	Tractor alone	1	N.A.	.60	N.A.	.75	N.A.
Apply fertilizer	Fertilizer attachment	2	1.60	1.60	N.A.	2.00	N.A.
	Fertilizer tender	2	.76	.76	N.A.	2.00	N.A.
Press beds and fumigate	Bedder disk assembly	1	1.00	N.A.	1.0	1.25	1.25
	Bed press	1	1.00	N.A.	N.A.	N.A.	N.A.
	Fumigation rig	1	1.00	N.A.	N.A.	N.A.	N.A.
Lay plastic	Plastic layer	1	1.00	1.00	N.A.	1.25	2.50
Cut cross ditches	Ditcher	1	1.00	1.00	N.A.	1.25	3.00
Punch holes	Hole puncher	1	.60	.60	N.A.	.75	N.A.
Prepare plug mix	Mixer	1	.60	.60	N.A.	.75	N.A.
Cultivation:							
Plant	Mechanical planter	1	1.00	1.00	N.A.	1.25	1.25
Water	Water wagon	12	3.84	3.84	N.A.	4.80	N.A.
Apply herbicide	Paraquat sprayer	2	1.00	1.00	N.A.	1.25	N.A.
Sprayer	Boom sprayer	20	5.00	5.00	N.A.	6.25	N.A.
Weed and thin	Hand labor	2	N.A.	N.A.	N.A.	N.A.	30.00
Other hand labor	Hand labor	N.A.	N.A.	N.A.	N.A.	N.A.	25.00
Water control	Pump and 100-horsepower diesel engine	N.A.	15.00	N.A.	N.A.	N.A.	5.00
Total		N.A.	N.A.	17.00	3.16	26.25	83.00

N.A. = not applicable.

Appendix table 15--Green pepper production in southwest Florida: machinery and equipment cost per acre, 1978/79

Item	Time used	Cost per hour		Total cost	
		Ownership	Operation	Ownership	Operation
	Hours	Dollars			
Rotary mower	0.60	1.48	0.90	0.89	0.54
11-foot disk	1.56	3.00	2.40	4.68	3.75
Fertilizer attachment (2 rows)	1.60	3.55	3.21	5.68	5.14
Bedder disk assembly	1.00	.81	.64	.81	.64
Bed press	1.00	.48	.32	.48	.32
Fumigation rig	1.00	1.38	1.10	1.38	1.10
Plastic layer	1.00	.52	.42	.52	.42
Ditcher	1.00	.86	.49	.86	.49
Hole puncher	.60	.42	.24	.25	.14
Mixer	.60	2.10	1.20	1.26	.72
Mechanical planter	1.00	.80	.53	.80	.53
Water wagon	3.84	1.00	.67	3.84	2.57
Paraquat sprayer	1.00	.83	.62	.83	.62
Boom sprayer	5.00	4.08	3.40	20.40	17.00
Pump and 100-horsepower diesel engine	15.00	1.87	3.76	28.05	56.40
60-horsepower tractor	17.00	1.50	2.55	25.50	43.35
110-horsepower tractor	3.16	3.25	5.09	10.27	16.08
Fertilizer tender	.76	3.67	3.50	2.79	2.66
Total	N.A.	N.A.	N.A.	109.29	152.47

N.A. = not applicable.

Appendix table 16--Cucumbers: costs for producing and marketing in southwest Florida, 1978/79

Cost item	Description	Cost
		Dollars/acre
Preharvest:		
Clean ditches	Custom hire	35.00
Lime	1/2 ton hi-cal @ $15/ton	7.50
	1/2 ton dolomite @ $18/ton	9.00
Seed	2 pounds @ $25/pound	50.00
Fertilizer	1,000 pounds of 4-8-8, 30% organic with 60 pounds fritted trace elements added/ ton @ $125/ton	62.50
	2,000 pounds of 4-8-8 without fritted trace elements @ $115/ton	115.00
Cricket bait	40 pounds @ 20¢/pound	8.00
Fungicide	25 pounds Maneb @ $1.30/pound	32.50
	8 pounds Tri basic copper @ $1.50/pound	12.00
Insecticide	2.5 gallons Methomyl @ $16.50/gallon	41.25
	4 pints Cygon @ $18.50/gallon	9.25
Tractor labor	13.80 hours @ $4.58/hour	63.20
Other cultural labor	38.12 hours @ $3.54/hour	134.94
Supervisory labor	15 hours @ $6.10/hour	91.50
Machinery costs	Ownership	83.20
	Operating	110.05
Land rental		40.00
Administrative costs	Labor	24.43
	Other	16.29
Interest on operating capital 1/	$862.41 @ 9 percent for 4 months	25.87
Total preharvest		971.48
Yield per acre: 275 bushels		Dollars/bushel
Total preharvest		3.53
Harvest:		
Picking	$18/pallet, 15 bushel pack out	1.20
Hauling	$3.50/pallet, 15 bushel pack out	.23
Total harvesting		1.43
Packing and marketing:		
Labor		.45
Machinery and equipment	Ownership	.25
	Operation	.09
Pallets		.20
Boxes	60¢ each	.60
Miscellaneous supplies	Wax, chlorine, etc.	.07
Administrative costs	Labor	.06
	Other	.03
Selling costs	20¢/pack	.20
Total packing and marketing		1.95
Total costs		6.91

1/ Interest on machinery and equipment investment is included in machinery ownership costs.

Appendix table 17--Cucumber production in southwest Florida: hours of equipment and labor required to perform each operation, 1978/79

Operation	Equipment used	Times over	Hourly requirements per acre				
			Equipment	Tractor (60 hp)	Tractor (110 hp)	Tractor labor	Other labor
		Number	Hours				
Land preparation:							
Disk	11-foot disk	3	1.00	N.A.	1.00	1.25	N.A.
Mark off rows	Tractor alone	1		0.60	N.A.	0.75	N.A.
Apply fertilizer and form beds	Fertilizer hopper	1	1.50	N.A.	1.50	1.90	N.A.
	Pre-bedder	1	1.50	N.A.	N.A.	N.A.	N.A.
	Bed press	1	1.50	N.A.	N.A.	N.A.	N.A.
	Fertilizer tender	1	1.50	1.50	N.A.	1.90	N.A.
Cut cross ditches	Ditcher	1	1.00	1.00	N.A.	1.25	2.50
Cultivation:							
Plant	Mechanical seeder	1	.90	.90	N.A.	1.12	1.12
Thin	Hand labor	1	N.A.	N.A.	N.A.	N.A.	12.00
Cultivate and side-dress	Cultivator	2	2.00	2.00	N.A.	2.50	2.50
	Fertilizer hopper	2	2.00	N.A.	N.A.	N.A.	N.A.
Spray	Boom sprayer	10	2.50	2.50	N.A.	3.13	N.A.
Water control	Pump and 100-horse-power diesel engine	N.A.	10.00	N.A.	N.A.	N.A.	5.00
Other cultural labor	Hand labor	N.A.	N.A.	N.A.	N.A.	N.A.	15.00
Total		N.A.	N.A.	8.5	2.5	13.80	38.12

N.A. = not applicable.

Appendix table 18--Cucumber production in southwest Florida: machinery and equipment cost per acre, 1978/79

Item	Time used	Cost per hour		Total cost	
		Ownership	Operation	Ownership	Operation
	Hours	Dollars			
11-foot disk	1.0	3.00	2.40	3.00	2.40
Fertilizer hopper	3.5	3.55	3.21	12.43	11.24
Bedder disk assembly	1.5	.81	.64	1.22	.96
Bed press	1.5	.48	.32	.72	.48
Ditcher	1.0	.86	.49	.86	.49
Mechanical seeder	0.9	.80	.53	.72	.48
Cultivator	2.0	.81	.64	1.62	1.28
Boom sprayer	2.5	4.08	3.40	10.20	8.50
Pump and 100-horsepower diesel engine	10.0	1.87	3.76	18.70	37.60
60-horsepower tractor	8.5	1.50	2.55	12.75	21.67
110-horsepower tractor	2.50	3.25	5.09	8.13	12.70
Fertilizer tender	3.5	3.67	3.50	12.85	12.25
Total	N.A.	N.A.	N.A.	83.20	110.05

N.A. = not applicable.

Appendix table 19--Eggplant in Palm Beach County, Fla.: costs for producing and marketing, 1978/79

Cost item	Description	Cost
		Dollars/acre
Preharvest:		
Clean ditches	Custom hire	35.00
Grade fields	Custom hire	15.00
Fumigant	15 gallons Vorlex @ $9.60/gallon	144.00
Lime	1 ton dolomite @ $22/ton	22.00
Fertilizer	300 pounds 3-15-3 @ $115/ton	17.25
	500 pounds 0-20-0 @ $60/ton	15.00
	2,000 pounds 18-0-25 @ $190/ton	190.00
	30 pounds trace elements @ 20¢/pound	6.00
Plastic	3 rolls @ $60/roll	180.00
Plants	5,000 @ $.035/each	175.00
Cricket bait	30 pounds @ 20¢/pound	6.00
Herbicide	2 quarts Paraquat @ $36/gallon	18.00
Fungicide	45 pounds Maneb (80 percent w.p.) @ $1.30/ pound	58.50
	20 pounds Copper @ $1.50/pound	30.00
Insecticide	6 gallons Lannate @ $16.50/gallon	99.00
	3 gallons Cygon @ $18.50/gallon	55.50
	2 gallons Sticker @ $17.00/gallon	34.00
Tractor labor	27.25 hours @ $4.58/hour	124.81
Other cultural labor	109.5 hours @ $3.54/hour	387.63
Supervisory labor	40 hours @ $6.10/hour	244.00
Machinery costs	Ownership costs	109.82
	Operating costs	156.02
Land rental		95.00
Administrative expenses	Labor	59.87
	Other	39.92
Interest on operating capital 1/	$2,207.50 @ 9 percent for 6 months	99.33
Total preharvest		2,416.65
Yield per acre:	875 bushels	Dollars/bushel
Total preharvest		2.76
Harvest, packing, and marketing:		
Harvest labor	0.18 hours @ $3.72/hour	0.67
Boxes	60¢ each	.60
Paper	15¢/box	.15
Machinery costs	Ownership	.03
	Operating	.04
Transportation	15¢/box	.15
Brokers fee	20¢/bushel	.20
Total harvest, packing, and marketing		1.84
Total		4.60

1/ Interest on machinery and equipment investment is included in machinery ownership costs.

Appendix table 20--Eggplant in Palm Beach County, Fla.: hours of equipment and labor required to perform each operation for growing, 1978/79

Operation	Equipment used	Times over	Hourly requirements per acre				
			Equipment	Tractor (60 hp)	Tractor (110 hp)	Tractor labor	Other labor
		Number	Hours				
Land preparation:							
Destroy old plants	Rotary mower	1	0.60	N.A.	0.60	0.75	N.A.
Pull plastic	Hand labor	1	N.A.	N.A.	N.A.	N.A.	15.00
Cut up old plants	Weed chopper	1	.60	N.A.	.60	.75	N.A.
Disk	11-foot disk	6	.96	N.A.	.96	1.20	N.A.
Fumigate	Fumigation rig	1	1.00	1.00	N.A.	1.25	1.25
Press beds	Bed press	1	.80	N.A.	.80	1.00	N.A.
Apply fertilizer	Fertilizer rig	2	1.60	1.60	N.A.	2.00	N.A.
	Fertilizer tender	2	1.60	1.60	N.A.	2.00	N.A.
Cut cross ditches	Ditcher	1	1.00	1.00	N.A.	1.25	1.25
Lay plastic	Plastic layer	1	.80	.80	N.A.	1.00	2.00
Transplant	Transplanter	1	1.60	1.60	N.A.	2.00	10.00
Cultivation:							
Weeding	Hand labor	2	N.A.	N.A.	N.A.	N.A.	20.00
Spray paraquat	Paraquat sprayer	3	1.50	1.50	N.A.	1.87	N.A.
Spray fungicide	5-row sprayer	30	7.50	7.50	N.A.	9.38	N.A.
Water control	100-horsepower diesel engine and pump	N.A.	15.00	N.A.	N.A.	N.A.	20.00
Watering transplants	Water wagon	7	2.25	2.25	N.A.	2.80	N.A.
Packing	Mobile packing shed	N.A.	5.00	N.A.	N.A.	N.A.	N.A.
Other cultural labor	Hand labor	N.A.	N.A.	N.A.	N.A.	N.A.	40.00
Total		N.A.	N.A.	18.85	2.96	27.25	109.50

N.A. = not applicable.

Appendix table 21--Eggplant in Palm Beach County, Fla.: machinery and equipment costs per acre, 1978/79

Item	Time used	Cost per hour		Total cost	
		Ownership	Operation	Ownership	Operation
	Hours	Dollars			
Weed chopper	0.60	1.38	1.10	0.82	0.66
Rotary mower	.60	1.48	.90	.88	.54
11-foot disk	.96	3.00	2.40	2.88	2.30
Fumigation rig	1.00	1.38	1.10	1.38	1.10
Bed press	.80	.48	.32	.38	.26
Fertilizer rig	1.60	3.55	3.21	5.68	5.14
Ditcher	1.00	.86	.49	.86	.49
Plastic layer	.80	.52	.42	.42	.33
Transplanter	1.60	.50	.39	.80	.62
2-row sprayer	1.50	.83	.62	1.25	.93
5-row sprayer	5.00	4.08	3.40	20.40	17.00
Water wagon	2.25	1.00	.67	2.25	1.51
100-horsepower pump	15.00	1.87	3.76	28.05	56.40
60-horsepower tractor	18.85	1.50	2.55	28.28	48.07
100-horsepower tractor	2.96	3.25	5.09	9.62	15.07
Fertilizer tender	1.60	3.67	3.50	5.87	5.60
Total	N.A.	N.A.	N.A.	109.82	156.02

N.A. = not applicable.

Appendix table 22--Vegetable production in southern Florida: equipment and equipment costs, 1978

Item	New cost	Salvage value 1/	Total depreciation	Years on farm 2/	Annual usage 2/	Costs per hour		
						Fixed 3/	Variable 4/	Total
	Dollars			Years	Hours	Dollars		
Tractor, 110 horsepower	26,000	2,600	23,400	10	1,200	3.25	5.09	8.34
Tractor, 60 horsepower	12,000	1,200	10,800	10	1,200	1.50	2.55	4.05
Diesel engine and pump, 100 horsepower	15,000	1,500	13,500	10	1,200	1.87	3.76	5.63
Diesel engine and irrigation pump, 60 horsepower	7,450	745	6,705.	7	1,715	.81	2.08	2.89
Disk (heavy), 11 feet	5,000	500	4,500	10	250	3.00	2.40	5.40
Rock land disk, 13 feet	9,200	920	8,280	5	500	4.42	4.42	8.82
Rotovator, 80 inches	5,000	500	4,500	10	250	3.00	2.40	5.40
Land leveler, 12 feet	3,400	340	3,060	20	125	2.85	.81	3.67
Ditch plow	785	78	707	15	250	.38	.25	.63
Ditcher (cross ditches)	900	90	820	20	110	.86	.49	1.35
Bedder disk assembly (1-row)	650	65	585	10	120	.81	.64	1.45
Bedder disk rig (3-row)	3,000	300	2,700	15	75	3.91	1.41	5.32
Bed press (1-row)	1,000	100	900	15	250	.48	.32	.80
Bed press (3-row)	4,000	400	3,600	15	50	9.60	1.92	11.52
Fertilizer attachment	3,200	320	2,880	7	170	3.55	3.21	6.76
Fertilizer (3-row)	5,600	560	5,040	15	70	9.60	5.60	15.20
Fertilizer tender	3,500	350	3,150	6	200	3.67	3.50	7.17
Fumigation rig (1-row)	1,100	110	990	10	120	1.38	1.10	2.48
Fumigation-plastic layer rig (3-row)	5,000	500	4,500	15	80	7.50	2.40	9.90
Plastic layer (1-row)	870	87	783	10	250	.52	.42	.94
Hole puncher	600	60	540	20	150	.42	.24	.66
Mixer	1,000	100	900	20	50	2.10	1.20	3.30
Mechanical planter (2-row)	800	80	720	10	150	.80	.53	1.33
Planter (3-row)	7,500	750	6,750	7	180	7.85	6.25	14.10
Mechanical transplanter (1-row)	825	82	743	10	250	.50	.39	.89
Stake wagon	750	75	675	20	240	.33	.15	.48
Air hammers (set of 4)	1,700	170	1,530	10	120	2.12	1.71	3.83
Cultivator	650	65	585	10	120	.81	.64	1.45
Water wagon	2,000	200	1,800	10	300	1.00	.67	1.67
Sprayer (2-row)	1,500	150	1,350	10	240	.83	.62	1.45
Boom sprayer	8,500	850	7,650	5	500	4.08	3.40	7.48
L.P. gas burner	2,400	240	2,160	10	120	3.00	2.00	5.00
Rotary mower (6 feet)	1,500	150	1,350	20	100	1.48	.90	2.38
Weed chopper	1,100	110	990	10	120	1.38	1.10	2.49
Mobile packing shed	40,000	4,000	36,000	20	600	7.00	7.27	14.27

1/ Salvage value based on 10 percent of new cost.
2/ Estimated wear-out life, (years on farm) x (annual usage) based on [6, p.333].
3/ Includes depreciation and a charge for interest, taxes, housing, and insurance. Hourly depreciation is derived by dividing total depreciation by hours of total use life. Interest, taxes, housing, and insurance are charged at an annual rate of 6 percent of new cost [6, p.328].
4/ Includes charges for repairs and maintenance, fuel, and lubrication; based on [6, pp.328-333].

Sinaloa Cost Estimates

The following tables show the budgets for producing tomatoes, peppers, cucumbers, and eggplants in Sinaloa. Each budget is followed immediately by a labor use documentation.

Quantities of inputs were based on personal interviews with producers supplemented by visits to vegetable fields and observation of production activities. In some cases, estimates rely partly on budgets developed by CAADES for the 1976/77 season. Technical coefficients given by CAADES were verified and, in some cases, adjusted according to information obtained by several visits to the production area during the period October 1978 to January 1979. Current data on input prices were obtained from input suppliers.

Cost of machinery services were based on custom rates for preplant operations. Post-planting machine service costs were based on discussions with growers in west Mexico about costs on their farm. Pesticide costs, too, were based on discussions with producers about costs in their operations.

Appendix table 23--Staked tomatoes in Sinaloa: costs for producing and marketing, 1978/79

Item	Description	Cost	
		Pesos/ hectare	Dollars/ acre
Preharvest:			
Land rent		5,000	88.62
Ground preparation	Custom hire rates	3,832	67.92
Seed		1,000	17.71
Greenhouse	Ownership and operation	1,925	34.12
Machine services	Ownership and operation	5,563	98.61
Pesticide application	Custom hire	527	9.34
Fertilizer	700kg N, 600kg P_2O_5, 400kg K_2O	12,000	212.71
Pesticides		8,000	141.81
Stakes	667 large and 4,000 small	8,000	141.81
Cord and wire	135 kg wire, 92 kg cord	3,434	60.87
Polyfoam boxes		1,935	34.30
Labor	5.5 days tractor driver @ 190 pesos/day	1,045	18.51
	3.2 days truck driver @ 157 pesos/day	502	8.90
	1 day pesticide application @ 137 pesos/day	137	2.43
	114.6 days other labor @ 126 pesos/day	14,434	255.85
Administrative cost	4.5% of noninterest cost	3,029	53.70
Interest on operating capital	12% of operating capital for 5 months	3,518	62.36
Total preharvest		73,881	1,309.57
Export yield per acre:	890 30-pound equivalents		Dollars per 30-lb carton
Harvest:			
Picking	382 man-days at 129 pesos/day	49,278	.98
Hauling		3,600	.07
Total harvest		52,878	1.05
Packing and marketing:			
Labor		9,040	.18
Machinery		19,079	.38
Pallets		1,008	.02
Cartons	(Average of 2-pound and 3-layer boxes) x 30/25	39,163	.78
Miscellaneous	Packing, materials, and labels	7,032	.14
Sales commission	10% of average price of $6	30,125	.60
Administrative	4.5% of cost	7,534	.15
Crossing costs	$60 per truck	2,510	.05
Fees	CAADES, UNPH, road tax, university tax	1,004	.02
Production tax		6,527	.13
Tariff	1.87¢/pound (weighted average of 1.5¢ and 2.1¢)	28,117	.56
Transport to Nogales	$722 per load of 1,200 boxes	30,125	.60
Total packing and marketing		181,264	3.61

Appendix table 24--Staked tomatoes in Sinaloa: labor required to perform each operation for growing, 1978/79

Operation	Tractor driver 1/	Truck driver	Pesticide application	Other labor
	Man-days/hectare			
Planting:				
Grow seedling	N.A.	N.A.	N.A.	3.00
Irrigate for planting	N.A.	N.A.	N.A.	1.00
Plant and replant	N.A.	N.A.	N.A.	10.20
Transport plants	N.A.	N.A.	N.A.	.50
Cultivation:				
Irrigation (18 times)	N.A.	N.A.	N.A.	10.50
Tractor cultivation	0.5	N.A.	N.A.	N.A.
Hand cultivation	N.A.	N.A.	N.A.	16.25
Prune plants	N.A.	N.A.	N.A.	24.30
Scare birds	N.A.	N.A.	N.A.	6.00
Apply fertilizer	5.0	N.A.	N.A.	N.A.
Apply pesticides	N.A.	N.A.	1.0	N.A.
Install stakes	N.A.	N.A.	N.A.	11.85
Install wire and cord	N.A.	N.A.	N.A.	18.00
Remove stakes	N.A.	N.A.	N.A.	11.00
Repair stakes	N.A.	N.A.	N.A.	2.00
Transport material	N.A.	3.2	N.A.	N.A.
Total	5.5	3.2	1.0	114.60

N.A. = not applicable.
1/ Does not include tractor driver labor for preplant operations. Cost for tractor labor used in preplant soil preparation is included in the custom rate charges for those operations.

Appendix table 25--Green peppers in Sinaloa: costs for producing and marketing, 1978/79

Item	Description	Cost	
		Pesos/ hectare	Dollars/ acre
Preharvest:			
Land rent		5,000	88.62
Ground preparation	Custom hire rates	3,832	67.92
Seed	2.2 pounds	700	12.41
Greenhouse	Ownership and operation	2,017	35.75
Machine service	Ownership and operation	5,332	94.51
Pesticide application	Custom service	3,094	54.84
Fertilizer	350kg N, 300kg P_2O_5, 300 kg K_2O	6,630	117.63
Pesticides		12,000	212.71
Rockets		100	1.77
Stakes	833 @ 3 pesos each	2,500	44.31
Cord and wire		2,000	35.45
Polyfoam boxes		2,638	46.76
Labor	5.5 days tractor driver @ 190 pesos/day	1,045	18.51
	3.8 days truck driver @ 157 pesos/day	686	12.16
	2 days pesticide application @ 137 pesos/day	274	4.85
	92.45 days other labor @ 126 pesos/day	11,655	206.54
Administrative cost		2,677	47.45
Interest on operating capital		3,109	55.11
Total preharvest		65,289	1,157.30
Export yield per acre	645 28-pound bushels		Dollars/ bushel
Total preharvest			1.79
Harvest:			
Picking	122 man-days @ 129 pesos/day	22,833	.63
Hauling		1,819	.05
Total harvest		24,652	.68
Packing and marketing:			
Labor		5,822	.16
Machinery		7,284	.20
Cartons		25,107	.69
Pallets		732	.02
Miscellaneous		5,458	.15
Administrative	4.5% of cost	7,270	.20
Sales commission	10% of average price of $9.40	34,204	.94
Crossing charges	$60 per truck	2,547	.07
Fees	CAADES, UNPH, road tax, university tax	728	.02
Production tax		1,092	.03
Tariff	25¢/pound	25,470	.70
Transport to Nogales	$722 per load of 850 bushels	30,929	.85
Total packing and marketing:		146,643	4.03
Total costs			6.50

Appendix table 26--Green peppers in Sinaloa: labor required to perform each operation for growing, 1978/79

Operation	Tractor driver 1/	Truck driver	Pesticide application	Other labor
	Man-days/hectare			
Planting:				
Grow seedling	N.A.	N.A.	N.A.	5.80
Irrigate for planting	N.A.	N.A.	N.A.	1.00
Plant and replant	N.A.	N.A.	N.A.	24.70
Transport plants	N.A.	N.A.	N.A.	1.40
Cultivation:				
Irrigation	N.A.	N.A.	N.A.	10.50
Tractor cultivation	0.5	N.A.	N.A.	N.A.
Hand cultivation	N.A.	N.A.	N.A.	17.25
Scare birds	N.A.	N.A.	N.A.	4.00
Apply fertilizer	5.0	N.A.	N.A.	N.A.
Apply pesticides	N.A.	N.A.	2.0	N.A.
Install stakes	N.A.	N.A.	N.A.	5.80
Install wire and cord	N.A.	N.A.	N.A.	18.00
Remove stakes	N.A.	N.A.	N.A.	4.00
Transport material	N.A.	3.8	N.A.	N.A.
Total	5.5	3.8	2.0	92.45

N.A. = not applicable.
1/ Does not include tractor driver labor for preplant operations. Cost for tractor labor used in preplant soil preparation is included in the custom rate for those operations.

Appendix table 27--Cucumbers in Sinaloa: costs for producing and marketing, 1978/79

Item	Description	Cost	
		Pesos/ hectare	Dollars/ acre
Preharvest:			
Land rent		5,000	88.62
Ground preparation	Custom hire rates	3,934	69.73
Seed	5 pounds @ 156 pesos/pound	780	13.82
Machine services	Ownership and operation	3,947	69.97
Fertilizer	400kg N, 350kg P_2O_5, 450kg K_2O	9,384	166.34
Pesticides		6,038	107.03
Rockets		120	2.13
Stakes	667 large and 5,000 small	8,000	141.81
Cord and wire	135 kg wire, 90 kg cord	3,434	60.87
Labor	6.4 tractor drivers @ 190 pesos/day	1,216	21.55
	2.8 truck drivers @ 157 pesos/day	440	7.80
	2 pesticide applications @ 137 pesos/day	274	4.85
Administrative cost	4.5% of non interest costs	2,299	40.76
Interest on operating capital	12% of operating capital for 5 months	2,670	47.33
Total preharvest		56,060	993.96
			Dollars/ bushel
Export yield per acre:	500 52-pound bushels		
Total preharvest			1.99
Harvest:			
Picking	133 days @ 129 pesos/day	17,157	.61
Hauling		1,410	.05
Total harvest		18,567	.66
Packing and marketing:			
Labor		4,805	.17
Machinery		5,652	.20
Cartons		19,463	.69
Pallets		1,130	.04
Miscellaneous		2,539	.09
Administrative	4.5% of costs	6,500	.23
Sales commission	10% of average price of $7.40/bushel	20,873	.74
Crossing cost	$60/load of 700 bushels	2,538	.09
Fees	CAADES, UNPH, road tax, university tax	1,130	.04
Production tax		1,393	.05
Tariff	2.6¢/pound (weighted average of 2.2¢ and 3¢)	38,136	1.35
Transport to Nogales	$722 per load of 700 bushels	29,110	1.03
Total packing and marketing		269	4.72
Total costs			7.37

Appendix table 28--Cucumbers in Sinaloa: labor required to perform each operation for growing, 1978/79

Operation	Tractor driver 1/	Truck driver	Pesticide application	Other labor
	Man-days/hectare			
Planting:				
Plant and replant	1.0	N.A.	N.A.	1.00
Irrigate for planting	N.A.	N.A.	N.A.	1.00
Cultivation:				
Irrigation	N.A.	N.A.	N.A.	8.00
Tractor cultivation	.4	N.A.	N.A.	N.A.
Hand cultivation	N.A.	N.A.	N.A.	8.75
Scare birds	N.A.	N.A.	N.A.	3.40
Arrange runners	N.A.	N.A.	N.A.	5.00
Apply fertilizer	5.0	N.A.	N.A.	N.A.
Apply pesticides	N.A.	N.A.	2.0	N.A.
Install stakes	N.A.	N.A.	N.A.	11.50
Install wire and cord	N.A.	N.A.	N.A.	16.00
Remove stakes	N.A.	N.A.	N.A.	11.00
Repair stakes	N.A.	N.A.	N.A.	2.00
Transport materials	N.A.	2.8	N.A.	N.A.
Total	6.4	2.8	2.0	67.65

N.A. = not applicable.
1/ Does not include tractor driver labor for preplant operations. Cost for tractor labor used in preplant soil preparation is included in the custom rate charges for those operations.

Appendix table 29--Eggplant in Sinaloa: cost for producing and marketing, 1978/79

Cost item	Description	Cost	
		Pesos/ hectare	Dollars/ acre
Preharvest:			
Land rent		5,000	88.62
Ground preparation	Custom hire rates	3,832	67.92
Seed	500 grams @ 1.24/gram	620	10.99
Greenhouse	Ownership and operation	2,528	44.81
Machine services	Ownership and operation	3,587	63.59
Fertilizer	700kg N, 600kg P_2O_5, 400kg K_2O	12,000	212.71
Pesticide		4,000	70.90
Rockets		120	2.13
Stakes	667 large and 4,000 small	8,000	141.81
Cord and wire	135kg wire and 92kg cord	3,434	60.87
Polyfoam boxes		879	15.58
Labor	5.5 days tractor driver @ 190 pesos/day	1,045	18.52
	2.8 days truck driver @ 157 pesos/day	446	7.91
	2 days pesticide application @ 137 pesos/day	274	4.85
	113.8 days other labor @ 126 pesos/day	14,339	254.17
Administrative cost	4.5% of non-interest cost	2,704	47.94
Interest on operating capital	12% of operating capital for 5 months	3,140	55.66
Total preharvest		65,948	1,168.98
Export yield per acre:	950 33-pound bushels		Dollars/ bushel
Total preharvest			1.23
Harvest:			
Picking	125 days @ 129 pesos/day	16,125	.30
Hauling		3,216	.06
Total harvest		19,341	.36
Packing and marketing:			
Labor		9,650	.18
Machinery		10,719	.20
Pallets		1,070	.02
Cartons		38,588	.72
Miscellaneous		1,610	.03
Administrative	4.5% of costs	8,575	.16
Sales commission	10% of average price of $5/bushel	26,797	.50
Crossing costs	$60/load	4,288	.08
Fees	CAADES, UNPH, road tax, university tax	2,144	.04
Production taxes	1.14¢/pound (average of 1.1¢ and 1.5¢)	1,072	.02
Tariff	$722/load of 775 bushels	20,366	.38
Transport to Nogales		49,842	.93
Total packing and marketing		174,721	3.26
Total cost			4.85

Appendix table 30--Eggplant in Sinaloa: labor required to perform each operation for growing, 1978/79

Operation	Tractor driver 1/	Truck driver	Pesticide application	Other labor
	Man-days/hectare			
Planting:				
Grow seedling	N.A.	N.A.	N.A.	3.0
Irrigate for planting	N.A.	N.A.	N.A.	1.0
Plant and replant	N.A.	N.A.	N.A.	6.0
Transport plants	N.A.	N.A.	N.A.	.5
Cultivation:				
Irrigation	N.A.	N.A.	N.A.	11.9
Tractor cultivation	0.50	N.A.	N.A.	N.A.
Hand cultivation	N.A.	N.A.	N.A.	13.0
Prune plants	N.A.	N.A.	N.A.	18.9
Scare birds	N.A.	N.A.	N.A.	19.0
Apply fertilizer	5.0	N.A.	N.A.	N.A.
Apply pesticides	N.A.	N.A.	2.0	N.A.
Install stakes	N.A.	N.A.	N.A.	11.5
Install twine and cord	N.A.	N.A.	N.A.	18.0
Remove stakes and wire	N.A.	N.A.	N.A.	11.0
Transport material	N.A.	2.8	N.A.	N.A.
Total	5.5	2.8	2.0	113.8

N.A. = not applicable.

1/ Does not include tractor driver labor for preplant operations. Cost for tractor labor used in preplant soil preparation is included in the custom rate charges for those operations.

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