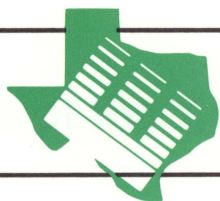


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Texas Agricultural Extension Service

TRENDS OF THE SPINACH INDUSTRY



IN TEXAS & THE UNITED STATES



Texas Agricultural Extension Service • Zerle L. Carpenter, Director
The Texas A&M University System • College Station, Texas

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Trends of the Spinach Industry in Texas and the United States

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The purpose of this publication is to present background information and illustrate trends important to the spinach industry in Texas and the United States. Initial background information is presented, focusing on the spatial and temporal distribution of spinach production, principal outlets for this production, and changes in consumption patterns. This is followed by more detailed data on the spatial and temporal aspects of spinach production in Texas, regions which compete with Texas during its market window, and the associated changes in regional market shares, geographic location of markets for Texas production, seasonal price patterns, and production and marketing costs. This information should be of value to Texas producers and marketing agencies.

Background of the U.S. Spinach Industry

National production and consumption data for spinach are incomplete due to the elimination of the federal estimation program for spinach in 1981. However, some of the available data offers insight. Combined production of fresh and processed spinach increased between 1977 and 1980 from 388.6 million pounds to 448.4 million pounds. Three states (California, Texas and Arizona) have dominated U.S. spinach production. Texas is the major producer with 40 percent of total U.S. fresh market harvested acreage and 23 percent of total U.S. processed market acreage in 1980.

The principal outlet for spinach production in the United States is the processed market. In 1977, 79 percent of the spinach produced in the U.S. was destined for the processed market, as compared to 73 percent in 1980. Exports of U.S. spinach represent a minor market outlet, accounting for less than a 4 percent market share.

The overall per capita consumption of spinach is increasing. Per capita consumption of frozen and canned spinach remained relatively constant at 1.3 pounds from 1977 to 1982. However, per capita consumption of fresh spinach, a mere 0.6 pounds in 1977, increased to 0.9 pounds in 1981. This represents a 33 percent increase. This favorable trend for the fresh market is often attributed to health-conscious consumers who purchase spinach for its nutritional value (One cup of spinach contains 291 percent of the RDA of vitamin A, 112 percent of the RDA of vitamin C, 39 percent of the RDA for iron, and a mere 32 calories.), increased consumption of fresh vegetables in general (mostly in the form of salads), and an increase in the popularity of microwave dinners, in which spinach is a major green vegetable used.

Overview of the Processed Spinach Industry

Contributing to the problem of lack of data, neither the USDA nor the Texas Agricultural Statistics Service have reported historical statistics on Texas processed spinach production.

In order to prevent individual disclosure, Texas reports only fresh market spinach data. Thus, the focus of this document will be fresh market spinach trends. Nonetheless, the production of processed spinach in Texas is too important to be ignored entirely, so information provided by Extension specialists, researchers and industry leaders is summarized to provide a perspective of the processed spinach industry.

As mentioned earlier, the principal outlet for spinach production in the U.S. is the processed market (73 percent in 1980). From 1977 to 1980, spinach grown for processing averaged 20,753 acres annually. Texas typically produces 4000 to 5000 acres of spinach for processing (canning and freezing). This represents approximately 20 to 25 percent of the total U.S. supply and about half of the total spinach acreage in the state. Thus, the fresh and processed markets are equally important outlets for the state's spinach production.

In Texas, production of spinach for processing is concentrated in the San Antonio-Winter Garden and High Plains regions of the state. Yields for the state average about 9 tons per acre. Processed spinach usually is harvested mechanically, and with good weather and sound cultural practices three harvests can be obtained. Prices per cwt. average about \$4.25. Thus, a conservative estimate of the annual value of processed spinach in Texas would be \$3.06 million.

Factors Affecting the Texas Fresh Market Spinach Industry

Production and Value

The planted and harvested acreage, yield per acre, total production, seasonal average price and total value of Texas fresh market spinach are shown in Table 1. During the 1977-87 period, producers planted an average of 5,673 acres and harvested an average of 5,100 acres of fresh spinach each year (Figure 1). Yields for the 1977-87 period averaged 72 cwt. per acre, as compared to the U.S. average of 77 cwt. per acre from 1977 to 1980. However, spinach is adapted to spring, fall and winter production in various regions of the country and, in some areas such as Texas, a single planting may be harvested two or more times. As a result, average yields per acre may vary widely.

Texas fresh market spinach production averaged 367,000 cwt. annually from 1977 to 1987, with a peak of 489,000 cwt. in 1981. During the same period, the price received for Texas fresh spinach averaged \$30.94 per cwt. Since 1977, the value of fresh spinach production in Texas has averaged \$ 11.87 million, ranging from a low of \$3.568 million in 1977 to a high of \$17.06 million in 1981. Fresh spinach typically comprises 3 to 5 percent of the state's total vegetable revenues.

Locations, Production and Shipment Periods

As shown in Table 2, south Texas is the principal area of fresh market spinach production in the state. Currently, 86 percent of the harvested acreage is located in the San Antonio-Winter Garden region and 11 percent in the Rio Grande Valley (Figure 2). Zavala and Frio counties are the leading producers of fresh spinach in the San Antonio-Winter Garden region, as

Table 1. Texas Fresh Market Spinach: Acreage, Yield, Price and Value, 1977-87.

Year	Acres planted	Acres harvested	Yield/acre (cwt.)	Production (1000 cwt.)	Season avg. price (\$/cwt.)	Value (\$1000)
1977	3,700	3,400	51	175	20.39	3,568
1978	4,700	4,100	56	231	18.07	4,175
1979	6,800	6,100	43	260	30.25	7,864
1980	6,900	6,400	55	355	29.18	10,359
1981	5,800	5,300	92	489	34.90	17,064
1982	7,000	6,400	70	448	37.13	16,635
1983	5,700	5,200	90	478	34.30	16,604
1984	5,100	4,300	86	369	39.40	14,519
1985	6,200	5,300	90	477	36.30	17,315
1986	5,900	5,600	70	392	30.00	11,760
1987	4,500	4,000	90	360	30.40	10,944
Average	5,673	5,100	72	367	30.94	11,873

Source: **Texas Vegetable Statistics**, Texas Department of Agriculture, USDA, SRS, various issues 1977-87.

Note: Data concerning spinach produced for processed markets are not reported.

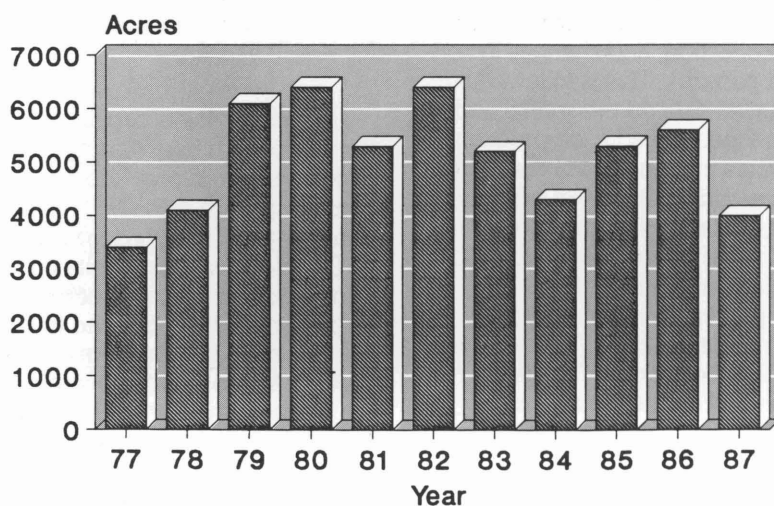


Figure 1. Texas Fresh Market Spinach Acreage, 1977-87.

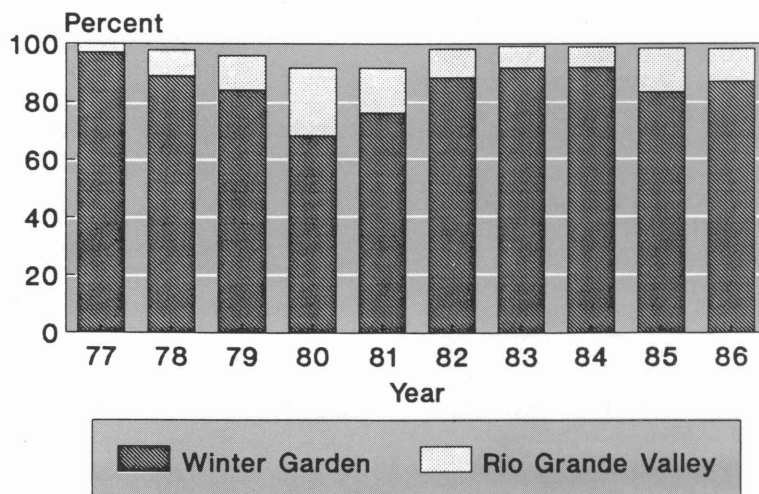


Figure 2. Texas Fresh Market Spinach Producing Regions, 1977-87.

Table 2. Texas Fresh Market Spinach: Harvested Acreage by Major Regions, 1977-87.

Year	Rio Grand Valley	Coastal Bend	Laredo	San Antonio Winter Garden	Total
	number of acres (percent of total acreage)				
1977	100 (3.03)	*	*	3200 (96.97)	3300
1978	150 (3.66)	*	*	3650 (89.02)	4100
1979	720 (11.8)	*	180 (2.95)	5130 (84.1)	6100
1980	1500 (23.44)	*	510 (7.97)	4370 (68.28)	6400
1981	820 (15.47)	*	420 (7.92)	4040 (76.23)	5300
1982	630 (9.84)	40 (0.63)	70 (1.09)	5660 (88.44)	6400
1983	390 (7.5)	20 (0.38)	20 (0.38)	4770 (91.73)	5200
1984	310 (7.21)	20 (0.47)	20 (0.47)	3950 (91.86)	4300
1985	800 (15.09)	40 (0.75)	40 (0.75)	4420 (83.4)	5300
1986	630 (11.25)	40 (0.01)	60 (0.01)	4870 (86.96)	5600

Source: **Texas Vegetable Statistics, Texas Agricultural Statistics**, Texas Department of Agriculture, Various issues.

Notes: * Indicates data not reported.
Total does not equal sum since some regions are excluded.

Table 3. Texas Fresh Market Spinach: Percent of Texas' Annual Shipments occurring in each January, February, March, April, November and December Shipping Period, 1977-87.

Year	Jan.	Feb.	March	April	Nov.	Dec.	Total
1977	19.62%	22.97%	21.53%	0.48%	6.70%	28.71%	100.00%
1978	21.66%	27.39%	26.75%	0.32%	9.87%	14.01%	100.00%
1979	18.82%	28.04%	24.35%	0.74%	2.95%	25.09%	100.00%
1980	25.07%	27.61%	23.66%	1.69%	4.51%	17.46%	100.00%
1981	30.16%	23.81%	22.22%	1.59%	3.81%	18.41%	100.00%
1982	25.94%	21.88%	19.38%	0.94%	4.37%	27.50%	100.00%
1983	28.96%	24.50%	20.54%	2.48%	5.69%	17.82%	100.00%
1984	18.77%	26.98%	25.81%	2.35%	7.33%	18.77%	100.00%
1985	17.47%	17.47%	26.20%	0.00%	5.24%	33.62%	100.00%
1986	30.43%	24.75%	17.39%	0.00%	8.36%	18.73%	100.00%
1987	26.45%	24.42%	19.48%	1.16%	7.56%	20.93%	100.00%
Average	23.94%	24.52%	22.48%	1.06%	6.03%	21.91%	

Source: **Fresh Fruit and Vegetable Shipment Totals by Commodity, States and Months**, U.S. Department of Agriculture, Agricultural Marketing Service, Fruit and Vegetable Division. FVUS-7, various issues.

well as in the state. Other important producers in south Texas include Hidalgo, Maverick, Medina and Uvalde counties. The Coastal Bend and Laredo regions of Texas produce minor amounts of spinach (1 percent each).

The Agricultural Marketing Service of the USDA collects information on monthly shipments of fresh vegetables by origin. The data in Table 3 are based on these estimates. These data show that Texas' shipments commence in early November, peak in December and January, and end in March or early April. On the average, about 93 percent of Texas' spinach shipments occur in four months: December (21.91 percent); January (23.94 percent); February (24.48 percent); and March (22.48 percent). These monthly percentages have been somewhat erratic since 1977, and no discernible trends are evident (Figure 3).

Market Locations

The Agricultural Marketing Service also collects data on arrivals of fresh vegetables at selected U.S. cities. Texas' market share was estimated from these data in order to identify the importance of various markets (Figure 4). As seen in Table 4, the state's market share is largest in the northeastern, south central and mid-western regions of the United States. As one might expect, Texas spinach is relatively unimportant in West Coast cities (except Salt Lake City and Denver), but very important in mid-western and south central cities (29.4 and 43 percent average market share, respectively).

Market Share and Competing Regions

The 1977 to 1987 annual shipments for major fresh spinach producing states are presented in Table 5. Total U.S. domestic shipments increased from approximately 286 thousand cwt. in 1977 to almost 702 thousand cwt. in 1987. Likewise, shipments of Texas fresh spinach increased from 209 thousand cwt. in 1977 to 344 thousand cwt. in 1987. Texas shipments in 1977 comprised 73 percent of total U.S. shipments, as compared to 47 percent in 1987. The declining share was due to the tripling of California shipments from 1985 to 1987. Additionally, Texas encountered severe disease problems during this time period, which reduced marketable yields. Texas and total U.S. shipments are compared in Figure 5.

Although all major spinach producing states experienced similar growth patterns during the 1977-87 period, Texas' annual market share has fluctuated, as shown in Figure 6. It remained fairly constant from 1977 until 1983, dropped slightly in 1984 and 1985, and has declined considerably since then.

A look at Texas' monthly market share (Figure 7) shows that market shares during the months of December, January, February and March remained relatively constant from 1977 to 1984 and exhibited a slight downward trend from 1985 to 1987. Market shares for the months of November and April, which mark the beginning and end of Texas' market season, respectively, have been quite erratic since 1977. This is due primarily to the effects of weather conditions and disease and insect damage.

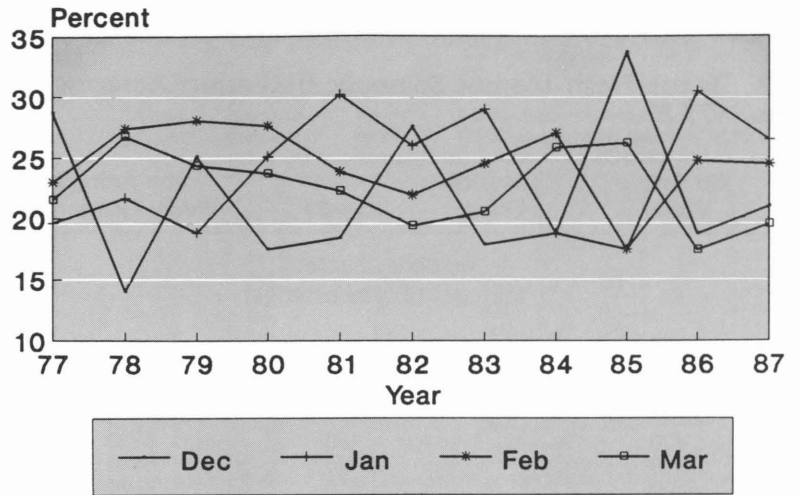


Figure 3. Percentage of Texas Fresh Spinach Shipments by Month, 1977-87.

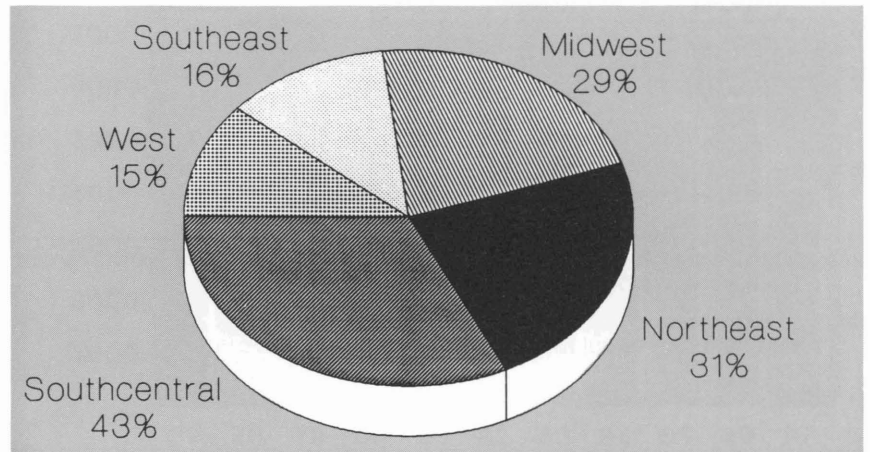


Figure 4. Texas Fresh Spinach Market Share by Terminal Market Region.

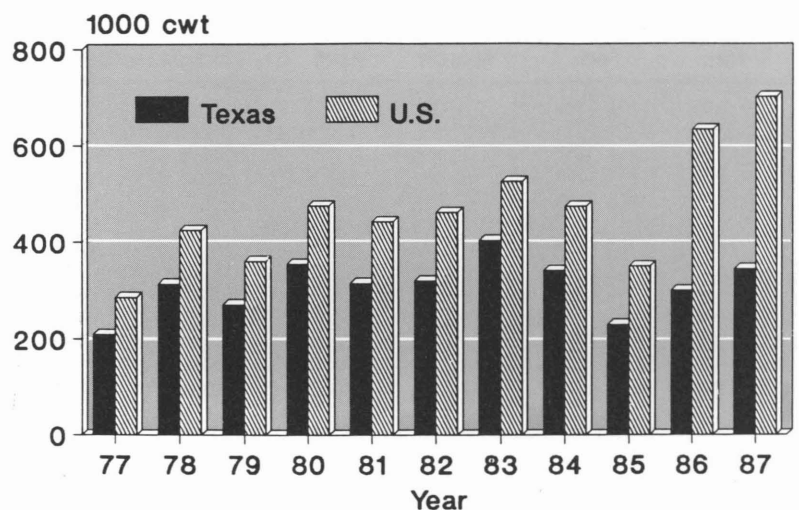


Figure 5. Annual Fresh Spinach Shipments for Texas and the U.S., 1977-87.

Table 4. Texas Fresh Market Spinach: Market Share by Terminal Market

Region	Estimated Market Share %
Northeast	
Baltimore-Washington	33.4
Boston	33.9
Buffalo	37.0
New York-Newark	23.4
Philadelphia	29.5
Pittsburg	28.0
Avg.	30.8
Midwest	
Chicago	22.4
Cincinnati	52.7
Detroit	44.4
St. Louis	16.8
Minneapolis	10.9
Avg.	29.4
Southeast	
Atlanta	0.8
Columbia S.C.	0.0
Louisville	63.9
Memphis	10.0
New Orleans	7.9
Avg.	16.52
South central	
Dallas	43.8
Houston	56.2
Oklahoma City	29.0
Avg.	43.0
West	
Denver	42.1
Los Angeles	0.0
San Francisco	0.0
Salt Lake	32.3
Seattle-Tacoma	0.0
Avg.	14.9

Source: **Fresh Fruit and Vegetable Arrival Totals For 22 Cities.** U.S. Department of Agriculture, Agricultural Marketing Service, Fruit and Vegetable Division, FVUS-3, various issues.

Note: Estimates are based on a 10-year average except for Houston, Louisville, Memphis, Minneapolis, Oklahoma City and Salt Lake City, which are based on a 1977-1980 average. Data for these cities were not collected after 1980.

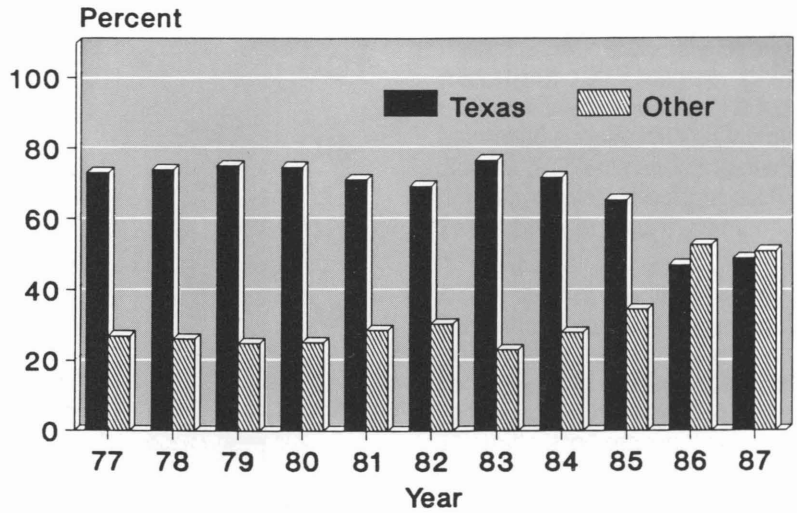


Figure 6. Texas Annual Fresh Spinach Market Share, 1977-87.

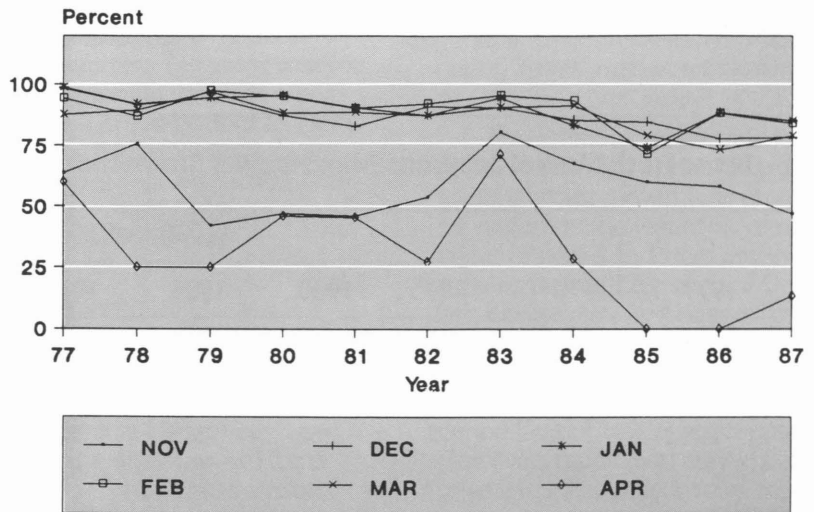


Figure 7. Trends in Texas Fresh Spinach Market Share by Selected Month, 1977-87.

The states that are Texas' main competitors during its November-April market window are identified in Figure 8 for the 1983-85 period. Texas dominates the market for six months, with Arizona and California having the second and third largest market shares during that time. California is the major shipper of fresh market spinach from May to October.

Imports of fresh market spinach by the U.S. have increased dramatically in the last 7 years (Figure 9), from 13 thousand cwt. in 1981 to more than 30 thousand cwt. in 1987. Nearly all of the spinach imports from 1981 to 1987 were from Mexico. However, imports still represent only about 2 to 4 percent of the total U.S. supply.

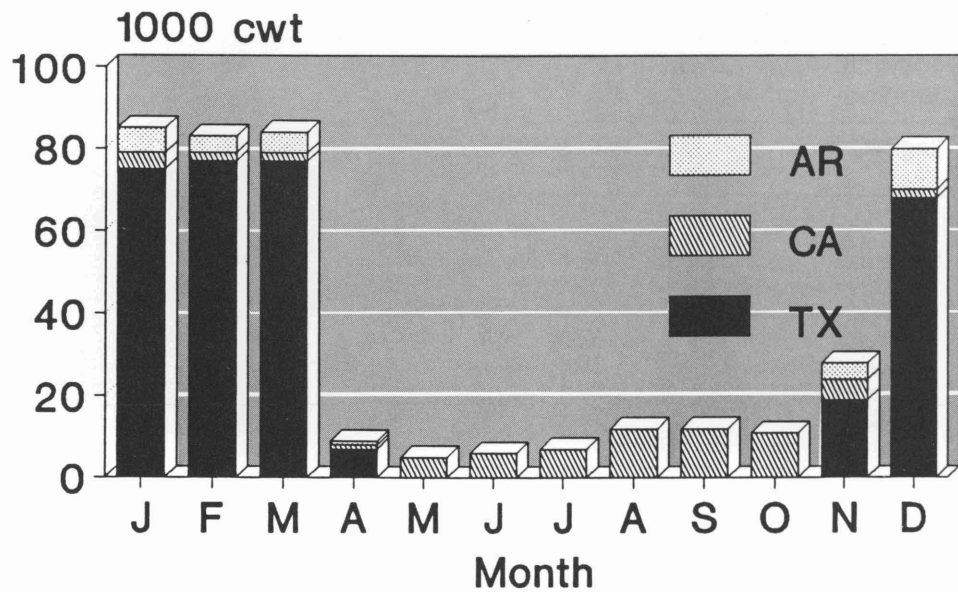


Figure 8. Average Monthly Fresh Spinach Shipments for Texas, Arizona and California, 1983-85.

Table 5. Texas Fresh Market Spinach: Estimated U.S. Domestic Shipments, Exports and Imports, 1977-87.

	(1000 cwt.)										
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Arizona	12	34	20	37	29	29	21	28	52	38	17
California	22	41	70	83	98	102	75	89	65	297	341
Colorado	43	36	0	0	0	0	0	0	0	0	0
Texas	209	314	271	355	315	320	404	341	229	299	344
U.S. domestic shipments	286	425	361	475	442	451	500	458	346	634	702
U.S. exports	0	0	0	0	0	10	26	16	4	0	0
U.S. shipments	286	425	361	475	442	461	526	474	350	634	702
Total imports (all Mexico)	0	0	0	0	13	1	12	12	20	26	30
U.S. domestic shipments plus imports	286	425	361	475	455	462	538	486	370	660	732

Source: **Fresh Fruit and Vegetable Shipment Totals by Commodity, States and Months**, U.S. Department of Agriculture, Agricultural Marketing Service, Fruit and Vegetable Division. FVUS-7, various issues.

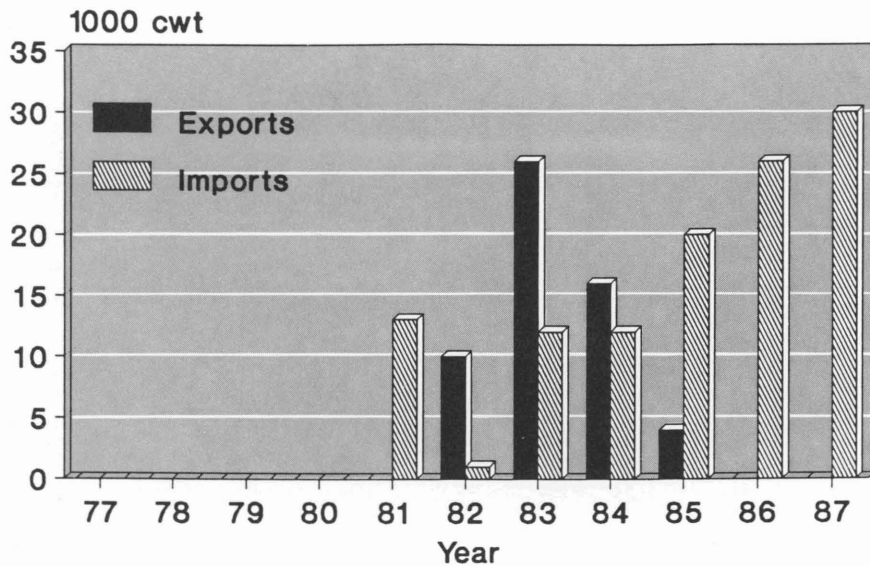


Figure 9. Annual Fresh Spinach Imports and Exports, 1977-87.

Marketing System

Marketing channels for Texas spinach are shown in Figure 10. The marketing system begins with growers and grower-shippers, who typically deliver their spinach to shipping point marketing firms. In some cases the grower also engages in shipping operations and becomes a grower-shipper. Packer-shippers and brokers are other types of shipping point marketing firms. Shipping point firms perform the selling function. As implied by their name, packer-shippers do not grow spinach; rather, they purchase from growers and pack the spinach for shipment. Brokers are not involved in the physical handling of spinach nor do they take title to the spinach. They merely facilitate title transfer by bringing buyer and seller together.

Wholesalers are usually classified as chainstore wholesalers, terminal market wholesalers or independent produce distributors. The chainstore wholesalers buy from shipping point firms and may often specify pack characteristics. The terminal market wholesalers serve retail and institutional buyers and typically operate in terminal market centers. Independent produce distributors are wholesale cash buyers and serve smaller grocery stores and other outlets.

Processors and food manufacturers also purchase Texas spinach for freezing and canning. Imports of frozen spinach are important to Texas since many of the imports are from Mexico and enter via Texas. Exports are not an important outlet for this state's spinach production.

Seasonal Prices

Data concerning seasonal prices in the U.S. were discontinued in 1981. However, nominal U.S. prices demonstrated a slight upward trend from 1977 to 1981. Texas seasonal

average prices of fresh market spinach fluctuated, but experienced an upward trend from 1977 through 1984, and have declined moderately since then. Increased supplies from California and disease problems affecting quality may partially explain the slight decline in Texas price in recent years.

In spite of moderate yearly price fluctuations, there is some regularity in price within the crop year as a result of consistency in seasonal demand, production and marketing patterns. The estimated seasonal price pattern for spinach during Texas' November to March market window, based on an analysis of 1978-87 data, is shown in Figure 11. The seasonal price index usually falls from a high of 103 in November to 94 in March, with a slight increase in February to 102. In general, prices remain fairly stable during Texas' market window.

The estimated upper and lower price limits which accompany the seasonal price movements provide information on the variability of monthly prices (Figure 11). Prices are the least variable during the month of December, while February prices exhibit the greatest variability. Prices near or above the seasonal average price during the November to February period favor Texas spinach producers. However, production during periods of price variability may involve more risk.

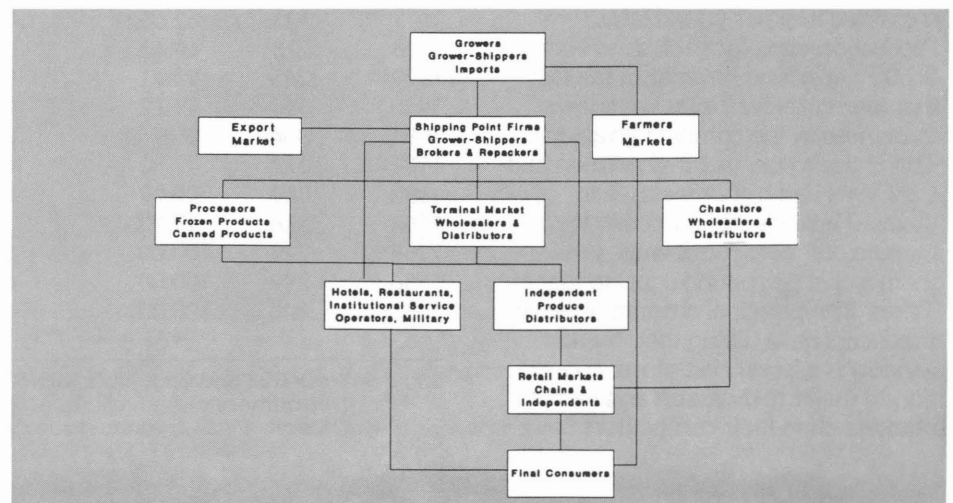


Figure 10. Spinach Marketing Channels.

Transportation

Trucks transport nearly 100 percent of spinach shipments from Texas (Table 6). Railroads carry less than 1 percent of the state's annual shipments, although rail was used more frequently from 1977 to 1983 (Figure 12). Trailer-on Flatcar (TOFC) shipments also are very few (0.29 percent of spinach shipments in 1984).

Production Costs

The comparative costs of producing fresh market spinach for the three major spinach producing states are presented in Table 7. Preharvest and fixed costs are lower for Texas producers than for Arizona or California producers. However, there are differences in how harvest costs are defined by reporting agencies from each state, and also the method by which the spinach is marketed. Texas harvest costs include the cost of harvest, packing and marketing (\$4.10 per 25-pound bushel basket). Arizona harvest costs include only the cost of picking and hauling (\$1.20 per 20-pound carton). California harvest costs include the cost of harvest, packing and marketing (\$3.00 per 20-pound carton).

In order to make a comparison between these competing regions using standard units and practices, total costs, excluding harvest costs, were converted to a per pound basis. Production costs for each state equaled \$0.05 per pound, in spite of the fact that total costs for Texas were lower than those in the competing regions. This is due to the fact that Arizona and California had higher yields than Texas. Thus, their higher costs were "spread out" over more units, giving them a cost per pound equal to that in Texas. The principal advantage Texas producers have during their market window is a lower cost of transportation to major midwestern and eastern markets than their competitors have.

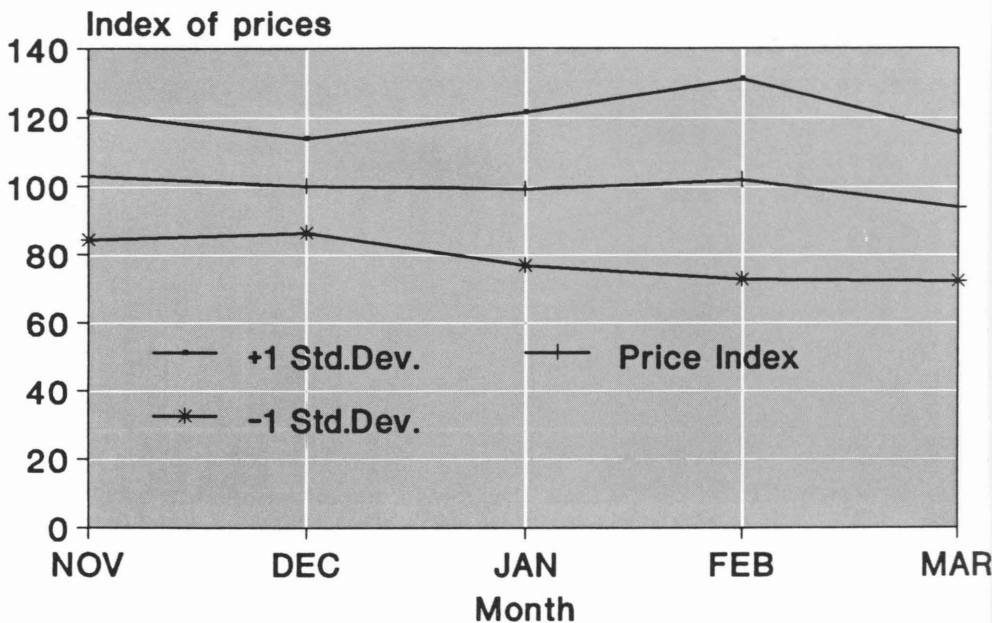


Figure 11. Index of Monthly Fresh Spinach Prices, Nov-Mar, 1977-87.

Table 6. Texas Fresh Market Spinach: Shipments Transported by Alternative Modes, 1977-87.

Year	Truck		TOFC		Rail	
	1000 cwt.	%	1000 cwt.	%	1000 cwt.	%
1977	131	62.68	0	0.00	78	37.32
1978	218	69.43	0	0.00	96	30.57
1979	245	90.41	0	0.00	26	9.59
1980	354	99.72	0	0.00	1	0.00
1981	304	96.51	0	0.00	11	3.49
1982	312	97.50	0	0.00	8	2.50
1983	389	96.29	0	0.00	15	3.71
1984	338	99.12	1	0.29	2	0.59
1985	229	100.00	0	0.00	0	0.00
1986	299	100.00	0	0.00	0	0.00
1987	344	100.00	0	0.00	0	0.00

Source: Fresh Fruit and Vegetable Shipment Totals by Commodity, States and Months, U.S. Department of Agriculture, Agricultural Marketing Service, Fruit and Vegetable Division. FVUS-7, various issues.

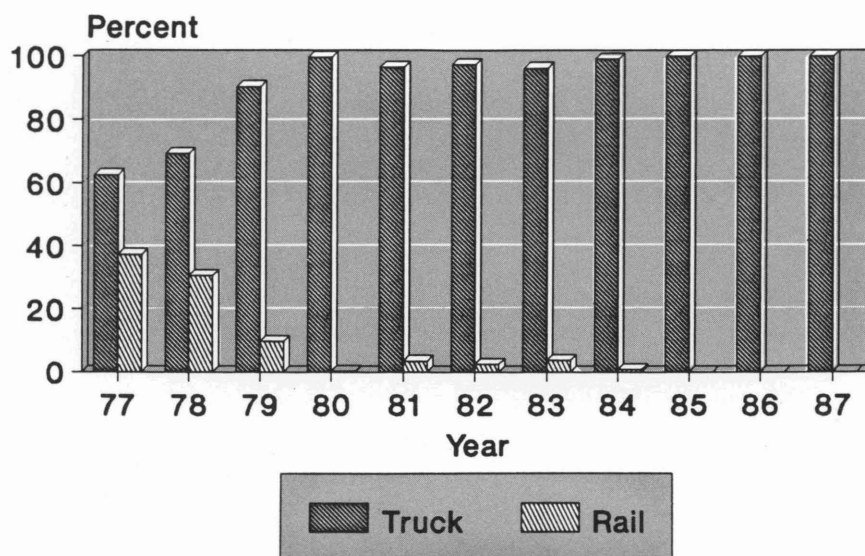


Figure 12. Texas Fresh Market Spinach Transportation Modes, 1977-87.

Table 7. Production Costs and Yields Reported by Major Fresh Market Spinach Producing States, 1988.

	Texas	Arizona	California
Production costs per acre:			
Preharvest costs	\$ 397.26	\$ 680.57	\$ 589.04
Harvest costs ¹	1,640.00	961.03	2,700.00
Fixed costs	149.31	178.74	305.81
Total costs	2,202.29	1,820.34	3,594.85
Yields:			
Units	bushels	cartons	cartons
# units/acre	400.00	800.00	900.00
Weight/unit	25 lbs	20 lbs	20 lbs
Lbs/acre	10,000	16,000	18,000
Per unit comparison:			
Total costs less harvest costs ¹	\$546.57	\$859.31	\$894.85
Total per pound	\$0.05	\$0.05	\$0.05

¹Harvest costs reported by each of the major fresh spinach producing states vary significantly. This is due to differences in defining the activities included in harvest costs. For example:

- (1) Texas harvest costs include the cost of harvesting, packing and marketing (\$4.10 per 25-lb. bushel basket).
- (2) Arizona harvest costs include only the cost of picking and hauling (\$1.20 per 20-lb. carton).
- (3) California harvest costs include the cost of harvesting, packing and marketing (\$3.00 per 20-lb. carton).

Because of these differences in defining harvest costs, and the fact that Texas reports yields in bushel basket units while Arizona and California report yields in 20-lb. carton units, total production costs are presented on a per pound basis (excluding harvest costs) so that a comparison can be made with common units and practices.

SUMMARY

The demand for fresh spinach increased from 1977 to 1982, and that trend is expected to continue. Texas accounts for 40 percent of total U.S. fresh market production, with 86 percent of the Texas acreage located in the Winter Garden region. Most Texas spinach (93 percent) is shipped between December and March.

From 1977 to 1983, Texas' annual market share was relatively constant (70 to 80 percent); it dropped slightly in 1984 and declined in recent

years. However, monthly Texas market shares from December to March remained fairly constant from 1977 to 1987. The major markets for Texas fresh market spinach are the northeastern, south central and midwestern regions of the United States.

Texas' main competition during the winter months comes from Arizona and California. Imports of spinach typically represent less than a 4 percent market share.

Almost all Texas fresh spinach is transported to market by truck, with alternate modes (rail and TOFC) used

sparingly in the last decade. Per unit production costs in Texas are equal to those in competing states. The fact that Texas is closer to south central, midwestern and northeastern markets than Arizona and California offers Texas producers some advantage. Fresh market spinach prices remained relatively stable during Texas' market window from 1978 to 1987, with the greatest price variability occurring during February.

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