

KEYS TO PROFITABLE SPINACH PRODUCTION

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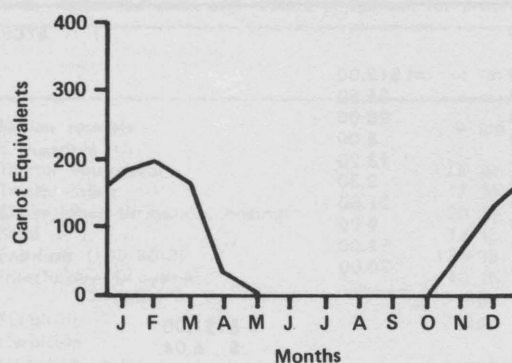
Extension Vegetable Specialists
The Texas A&M University System

Texas led the nation in 1970 spinach production by producing 33 percent of the total volume consumed. The value of the Texas winter spinach crop from 1966 to 1970 averaged \$2.3 million for fresh market spinach and about \$700,000 for processed spinach. Fresh market spinach acreage during the same period averaged 5,760 acres, and 3,300 acres were grown for processing.

Production areas

Spinach production in Texas is concentrated in the Winter Garden area with some production in the Lower Rio Grande Valley and Coastal Bend. Planting extends from early September to January, furnishing supplies from late November through March. Peak movement occurs from mid-December through the first half of March, as indicated in figure 1.

Fig. 1. Average unloads in carlot equivalents of Texas fresh spinach in 41 major cities by months, 1967-71.



Source: Fresh Fruit and Vegetable Unloads for 41 Major Cities, USDA Consumer Marketing Service, Fruit and Vegetable Division, Market News Branch, Washington, D.C.

Climatic requirement

Spinach is a cool-season crop which produces best quality and highest yield at an average day temperature of 65 to 75 degrees and a night temperature of 40 to 45 degrees. Spinach will withstand freezing temperatures into the low 20's when properly hardened by cool growing conditions. The dry, cool climate of the Winter Garden area is particularly adapted to spinach production. High humidity and warm temperatures are conducive to foliage diseases.

Soil type

Spinach has a deep tap root with an extensive fibrous root system which grows best in a deep loam or clay loam soil with good moisture holding capacity. These soils are best suited for furrow irrigation, although spinach can be grown successfully on sandy soils using sprinkler irrigation. Use well-drained soils and avoid heavy clay soils. Spinach grows best in soils having a pH range of 6.5 to 7.5.

Fertilizer

Loam and clay loam soils with a pH range from 7.2 to 8.0 generally do not need potassium applications. Band a fertilizer containing nitrogen and phosphorus such as 13-39-0 at 200 to 250 pounds per acre or 10-20-0 at 300 to 400 pounds per acre. Sandy soils with low potassium levels should receive a complete fertilizer such as 10-20-10 or 12-24-12 at the rate of 300 to 400 pounds per acre.

Band applications are more beneficial than broadcast. When banding, fertilizer should be placed 3 inches directly below the seed at planting time. Additional applications of nitrogen in the form of ammonium nitrate or ammonium sulfate will be required 30 to 45 days after emergence at the rate of 30 to 40 pounds actual nitrogen per acre. After each cutting, apply an additional 25 to 30 pounds of actual nitrogen and follow with irrigation.

Varieties

Flat leaf spinach types include Viroflay and Hybrid 424. Flat leaf varieties generally yield more but have a lighter green color. Hybrid 424 is resistant to downy mildew (blue mold).

Savoy leaf types include Hybrid 612, Dixie Market, Hybrid 7 and Dark Green Bloomsdale. Hybrid 612, Dixie Market and Hybrid 7 have resistance to downy mildew.

Seeding

Fresh market spinach is planted with 8 to 14 pounds of seed per acre. Use the lower rates on broadcast, flood-border irrigation method and the higher rates on shaped beds with furrow irrigation. Spinach grown for processing should be planted on shaped beds using 12 to 20 pounds of seed per acre.

Because most processed spinach is machine harvested, a thicker stand results in more upright growth, facilitating mower blade adjustments for less trashy leaves and shorter stems. An optimum stand for fresh market spinach is three to five plants per foot, but eight to ten plants per foot are desirable for processing. Seeding depth ranges from 1/4 inch on loam soils to 1/2 inch on sandy soils. Two or three seed drills are planted on shaped 40-inch rows.

Irrigation

Most spinach in Texas is grown under furrow or sprinkler irrigation. Seed is usually planted on dry soil and followed by an irrigation to initiate germination. Under dry conditions, a second irrigation may be required in 5 to 8 days. Generally, maturing a crop to the first harvest requires four to five irrigations. Additional irrigations are required between cuttings. Loam soils are furrow-irrigated and require about 4 acre-inches per application. When sprinkler irrigating, apply 1 1/4 to 2 acre-inches after the first irrigation.

Weed control

Ro-neet at 3 to 4 pounds per acre or Vegedex at 2 to 3 pounds per acre applied in 30 to 40

gallons of water per acre control most annual weeds in spinach. Incorporating Vegedex into the soil may reduce spinach seed germination. Vegedex is a volatile chemical and gives best results when applied to the soil surface immediately before the first irrigation. Ro-neet is most effective when incorporated 2 to 3 inches deep before seeding, but it may be applied as a soil surface application after seeding. Irrigation should follow herbicide applications.

Insects

Insect control is a major concern in spinach production. The cabbage looper and the green peach aphid are most difficult to control. Applications of methylparathion or parathion at the rate of 0.5 pounds per acre usually result in good control of the cabbage looper. Do not apply these chemicals within 14 days of harvest. Control aphids by applying phosdrin at the rate of 0.5 pound per acre. Apply Di-Syston at the rate of 1.0 pound actual per acre at planting time to control soil insects such as wireworms and grubs. Such applications result in early season control of sucking insects such as aphids and leafhoppers. *Read the labels.*

Other damaging insects in spinach are the spotted cucumber beetle, beet webworms and army-

Table 1. Estimated cost and returns of fresh market spinach in South Texas, 1972.

	No. of units	Value per unit	Cost or value	
Production receipts	300 20-lb. ctn	@ \$ 2.36		\$708.00
Cash expense				
Tractor equipment	15 hr.	@ \$.80	\$12.00	
Tractor labor	17 hr.	@ \$ 1.50	25.50	
Other labor (irrigation, hoeing)	20 hr.	@ \$ 1.40	28.00	
Seed	10 lb.	@ \$.80	8.00	
Fertilizer (60-60-0)	120 lb.	@ \$.11	13.20	
Insecticide—Di-syston	10 lb.	@ \$.23	2.30	
—Other	7 app.	@ \$ 3.00	21.00	
Fungicide	3 app.	@ \$ 3.00	9.00	
Herbicide		\$12.00	12.00	
Irrigation water		\$ 5.00	20.00	
Interest on operating capital	1/2 yr.	@ 8 %		\$151.00
				\$ 6.04
Land expense				
Interest on land	\$400/A.	@ 6 %	24.00	
Taxes			2.00	
Overhead				\$ 26.00
				25.00
Total cash expense				\$208.04
Harvest & marketing expense				
Harvesting, hauling, & ice	300 ctn.	@ \$.50	\$150.00	
Packing (includes container)	300 ctn.	@ \$.85	255.00	
Selling	300 ctn.	@ \$.20	60.00	
		1.55		\$465.00
Total expense				673.04
Return to management				\$ 34.96

worms which generally are controlled by parathion or phosdrin. The beet leafhopper feeds on young spinach and transmits the curly top virus disease which causes yellowing and dwarfing of the plant. Although symptoms may not be evident for 2 to 4 weeks after infection occurs, begin preventive measures in the seedling stages to control the beet leafhoppers and to reduce the curly top virus. Follow label directions concerning insecticide rates, time of application and safety precautions.

Diseases

Downy mildew (blue mold) and white rust are major spinach diseases. Several varieties are resistant to downy mildew, but varieties with resistance to white rust have not been developed. Use fungicide sprays with Maneb or Manzate 200 at 1½ to 2 pounds per acre in 50 to 60 gallons of water at 7 to 10-day intervals to prevent downy mildew and white rust.

Spinach curly top (yellows) is a virus disease transmitted by the beet leafhopper. Use early season insecticide applications to control the beet leafhopper.

Mosaic is caused by two or more virus diseases transmitted by aphids, leafhoppers or cucumber

beetles. Good insect control measures beginning in the seedling stage will help prevent serious losses.

Harvesting and packing

Fresh market spinach is hand harvested as loose leaf or close cut and placed in bushel baskets after trimming and grading. Most loose leaf spinach is prepackaged in small perforated cello bags which provide the consumer with a fresh, high-quality product.

Processed spinach is usually harvested mechanically and bulk loaded into trailers which are iced or refrigerated and delivered to the processing plant. With good cultural practices, three to four harvests can be obtained.

Marketing

Good-quality spinach is clean, fresh, tender and deep green. Any discolored or wilted leaves result in a short shelf life and poor consumer acceptance. Spinach is shipped to market in bushel baskets and crates, 2 dozen bunch cartons and wire-bound crates which weigh 20 to 22 pounds each.

Nearly 90 percent of fresh spinach is prepackaged in plastic bags to maintain quality.

About 50 percent of Texas spinach acreage is grown for canning and freezing. Processed spinach

Table 2. Estimated costs and returns of spinach for processing in South Texas, 1972

	No. of units	Value per unit	Cost or value	
Production receipts	9 ton	@ \$43.00		\$387.00
Cash expenses				
Tractor equipment	15 hr.	@ \$.80	\$12.00	
Tractor labor	17 hr.	@ \$ 1.50	25.50	
Other labor (irrigation, hoeing)	20 hr.	@ \$ 1.40	28.00	
Seed	14 lb.	@ \$.80	11.20	
Fertilizer (100-80-0)	180 lb.	@ \$.11	19.80	
Insecticide—Di-syston	10 lb.	@ \$.23	2.30	
—Other	10 app.	@ \$ 3.00	30.00	
Fungicide	3 app.	@ \$ 3.00	9.00	
Herbicide		@ \$12.00	12.00	
Irrigation water	6 app.	@ \$ 5.00	30.00	
				\$179.80
Interest on operating capital	½ yr.	@ 8 %		7.19
Land expense				
Interest on land (6 % on \$400/A.)	½ yr.	@ \$24.00	\$12.00	
Taxes	½ yr.	@ \$ 2.00	1.00	\$ 13.00
Overhead				25.00
Total cash expense				\$224.99
Harvest & marketing expense				
Harvesting & loading	9 ton	@ \$ 7.00	\$63.00	
Icing	9 ton	@ \$ 3.00	27.00	
Selling	9 ton	@ \$ 5.00	45.00	
				\$135.00
Total expense				359.99
Return to management				\$ 27.01

generally is contract grown and marketed by the ton.

Yields of fresh market spinach average 4,000 pounds per acre. Processed spinach generally averages 6.0-10.0 tons per acre with multiple harvests.

Cost and returns

Table 1 shows the itemized average production, overhead, marketing and harvesting costs on a per acre basis for fresh spinach. Table 2 shows these costs for processing spinach.

Table 3 shows the production and marketing costs per 20-pound carton as influenced by yield per acre. Table 4 shows the production and harvesting costs per ton as influenced by yield for processing spinach. Note that harvesting and marketing costs per unit decrease with increasing yield while the production costs per unit remain stable.

Table 3. Cost of producing and marketing per 20-pound carton of fresh spinach as influenced by marketable yield*

Yield, cartons/acre	Production	Harvesting* packing, selling	Total f.o.b. cost
150	\$1.39	\$1.55	\$2.94
200	1.04	1.55	2.59
250	.83	1.55	2.38
300	.69	1.55	2.24
350	.59	1.55	2.14
400	.52	1.55	2.07

*Based on production cost data in Table 1.

Figure 2. Price per 20-pound carton of fresh market spinach required to break even at various yields.

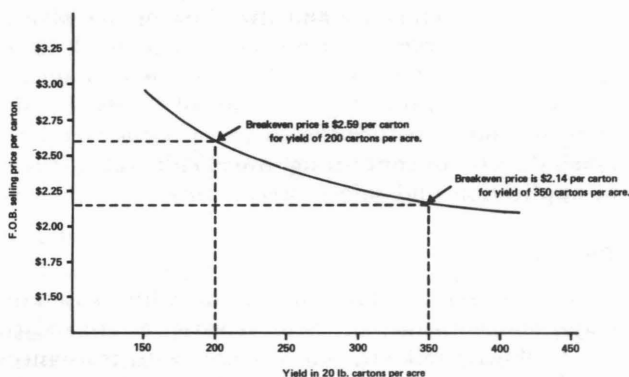


Figure 2 shows f.o.b. price per carton necessary to break even at various yields for fresh market spinach. A yield of 200 cartons requires \$2.59 to break even, as indicated in figure 2. A yield of 350 cartons requires \$2.14 per carton to break even.

Table 4. Cost of producing and marketing per ton of processing spinach as influenced by marketable yield*

Yield, ton/acre	Production	Harvesting* packing, selling	Total f.o.b. cost
5	\$45.00	\$15.00	\$60.00
7	32.14	15.00	47.14
9	25.00	15.00	40.00
11	20.45	15.00	35.45
13	17.31	15.00	32.31

*Based on production cost data in Table 2.

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