

Growing and Marketing Cabbage at Local Green Markets in Southeast Florida

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Stephen's Produce began growing and marketing cabbage (*Brassica oleracea* var. *capitata* L.) in 2003 from a 0.35-acre backyard market garden to help supply the West Palm Beach and Stuart green markets with a weekend supply of Agarden fresh@ produce. Flat cabbage was one of the 30 crops grown and has been included in the crop mix for the past four seasons. Planting schedules, growing and harvesting methods, yields, and sales figures will be discussed. For the 2006–07 season, 25 plantings of cabbage were made for 25 weeks of sales that began 11 Nov. and concluded 29 Apr. Cabbage was cut, excessive leaves trimmed off, and lightly spray washed the day before sales. Heads were generally sold for \$2.50 each. For the first three seasons an average of 12 heads of cabbage were sold each week.

THE BEGINNING OF CABBAGE SALES FOR GREEN MARKETS IN SOUTHEAST FLORIDA, 2003–07. The growers for Stephen's Produce were the first vendors to offer flat cabbage (cv. O-S Cross) for sale at green markets in Southeast Florida. Customers were already getting other brassica greens from Stephen's Produce: swiss chard, mizuna, bekana, bok choy, baby bok choy, kohlrabi, and turnips (Shuler et al., 2001b, 2003b, 2004a, 2006b). The first commercial production of flat cabbage was in Southwest Florida by C&B Farms, Clewiston, FL, a grower supplying produce to Asian markets in New York. After a visit to C&B Farms, some heads of flat cabbage were given to us to take home and eat. After remaining in the refrigerator for 4 weeks, the cabbage heads were stir fried. The cabbage had very thin leaves, was crunchy and sweet, and cooked in less than 2 min. Seeds were obtained from C&B Farms and once-a-week plantings began in late Aug. 2003. At the same time flat cabbage was introduced to the Greenmarket in West Palm Beach, a local Asian grower in Palm Beach County also began growing it commercially for his customers in the Northeast. A seed company described this cultivar as:

... a very large, rounded flat head cabbage, very popular in Alaska where it often wins awards for its size. Heat resistant, it is often grown as a mid to late season cabbage. O-S stands for oversized, it was one of the first commercially available hybrid cabbages. Excellent for eating fresh in coleslaw, steamed, or stir-fried. Use for making sauerkraut or for winter storage. An All-America winner in 1951. (Hume Seeds)

Note: The non-profit All-American Selections (AAS) organization was founded in 1932 to foster the development of new and better horticultural varieties for North America. Only the very best varieties receive this prestigious award. All AAS winners have been tested for home garden performance in more than 30 independent test sites, each under the responsibility of an AAS

judge, all over the United States and Canada. Most of the time only one to three varieties of vegetables receive this award each year, and sometimes none qualifies.

SOIL PREPARATION, IRRIGATION SETUP, AND MANAGEMENT. Garden soil preparation, broadcast fertilization, bed making, and irrigation setup and management has been handled similarly for the past several years (Shuler et al., 2001a, 2001b; 2002a, 2002b; 2003a, 2003b; 2004a, 2004b; 2005a, 2005b, 2006a, 2006b).

CROP ESTABLISHMENT WITH DIRECT SEEDING. Just before seeding, mole cricket bait (1% chlorpyrifos mole cricket bait; Micro Flo, Memphis, TN) used to control wire worms and cutworms, and topdress fertilizer (300 to 400 lb/acre 23–0–23 made from mixing equal amounts of potassium nitrate and ammonium nitrate) were sprinkled on the bed top. The cultivator attachment of a wheel-hoe was used on the row areas of the bed surface to incorporate the soil insecticide and fertilizer amendments and to loosen the area for planting.

Row furrows were pushed open with a hoe. Cabbage was direct seeded two rows per bed with three to five seeds per hill. Hills were spaced 11 to 12 inches apart. On wider beds, there were occasionally three rows per bed planted, with the middle row being a short season crop such as radish. Loose soil was pulled over the furrow and an automobile tire was rolled over the plant row to firm up the soil. After rolling, the effective depth of planting was judged to be about 0.5 inches. After approximately 15 to 20 d, hills were thinned to one plant.

GARDEN SPACE MANAGEMENT AND CROP SCHEDULING. From late August until first harvest for the beginning of the market sales season in late October, plantings of crops could be made any day of the week. After the harvesting and sales season began in late October, days available for planting were mostly limited to Monday through Thursday (Friday, Saturday, and Sunday were needed for harvest and sales). After the entire garden area was planted over once (usually by early to mid November), space available for new plantings was limited to areas where "just harvested" crops had been pulled out. Cabbage plantings were usually begun in late August and made at 5- to 6-d intervals until

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Table 1. Flat cabbage production from 0.02 acres for sale at green markets in Southeast Florida, 2003–04.

Date planted	Harvest period (dates)		Days to harvest		Avg days to harvest	Linear bed ft planted ^z	Cabbage planted (no.)	Cabbage harvested (no.)	Total value (\$) ^y	\$/Acre	\$/Acre per day ^x
	Start	Finish	Start	Finish							
21 Aug.	31 Oct.	14 Nov.	71	85	78	7.5	15	10	\$20	\$29,040	\$342
21 Aug.	31 Oct.	14 Nov.	71	85	78	7.5	15	12	\$24	\$34,848	\$410
28 Aug.	7 Nov.	15 Nov.	71	79	75	9	15	12	\$24	\$29,040	\$368
4 Sept.	15Nov.	2 Jan.	72	120	96	9	17	13	\$26	\$31,460	\$262
10 Sept.	28Nov.	19 Dec.	79	100	90	9	18	6	\$12	\$14,520	\$145
16 Sept.	28Nov.	12 Dec.	73	87	80	9.5	24	24	\$48	\$55,023	\$632
22 Sept.	19 Dec.	9 Jan.	88	109	99	7.5	18	14	\$28	\$40,656	\$373
28 Sept.	19 Dec.	2 Jan.	82	96	89	7.5	16	14	\$28	\$40,656	\$424
4 Oct. ^w	9 Jan.	27 Feb.	97	146	122	7.5	17	15	\$30	\$43,560	\$298
10 Oct.	16 Jan.	13 Feb.	98	126	112	8	18	14	\$28	\$38,115	\$303
16 Oct.	2 Jan.	23 Jan.	78	99	89	7.5	15	14	\$28	\$40,656	\$411
22 Oct.	16 Jan.	30 Jan.	86	100	93	7.5	16	16	\$32	\$46,564	\$465
28 Oct.	30 Jan.	20 Feb.	94	115	105	7.5	15	15	\$30	\$43,560	\$379
5 Nov.	6 Feb.	13 Feb.	93	100	97	6.5	16	6	\$12	\$20,105	\$201
13 Nov.	6 Feb.	14 Feb.	85	93	89	7.5	15	13	\$26	\$37,752	\$378
18Nov. ^w	14 Feb.	21 Feb.	88	95	92	8	19	16	\$32	\$43,560	\$459
25Nov. ^w	21 Feb.	5 Mar.	88	101	95	7	17	16	\$32	\$49,783	\$493
2 Dec.	6 Mar.	1 May	95	151	123	7	16	16	\$32	\$49,783	\$330
9 Dec. ^w	12Mar.	20 Mar.	94	102	98	7	16	15	\$30	\$46,671	\$458
16 Dec.	13Mar.	16 Apr.	88	122	105	7	16	14	\$28	\$43,560	\$357
23 Dec.	20Mar.	9 Apr.	88	108	98	10	22	17	\$34	\$37,026	\$346
30Dec. ^w	27Mar.	24 Apr.	88	116	102	7	16	15	\$30	\$46,671	\$402
6 Jan.	9 Apr.	24 Apr.	76	91	84	7	14	13	\$26	\$40,449	\$444
13 Jan.	9 Apr.	1 May	68	90	79	6	14	14	\$28	\$50,820	\$565
21 Jan. ^w	23 Apr	24 Apr.	83	84	84	7	16	15	\$30	\$46,671	\$556
29 Jan. ^w	24 Apr	14 May	85	105	95	6	13	8	\$16	\$29,040	\$277
4 Feb.	13 Feb.										
19 Feb. ^w	8 May	21 May	79	92	86	8	19	12	\$24	\$32,670	\$355
25 Feb. ^w	14 May	21 May	78	85	82	8	18	8	\$16	\$21,780	\$256
Totals			83.7	103.1	93	214	466	377	\$754	\$38,459	\$348
Avg for 28 plantings						7.6	16.6	13.5	\$26.93		
Avg for 30 weeks sales								12.6	\$25.13		

^zBeds were 4 ft center to center. Nineteen plantings were at two rows per bed; the other nine plantings were at three rows per bed.

^yBased on \$2.50 per head if all heads were sold.

^xBased on “Days to harvest—Finish.”

^wThese nine plantings were at three rows per bed; the other 19 plantings were at two rows per bed.

early November, when plantings were made every 7 d. Since harvest was at weekly intervals, this allowed for each successive week’s crop to have an extra day to mature; thus days to first harvest increased from approximately 70 to 80 d over the first 10 weeks of plantings.

For the 2003–04 season, 28 plantings were made beginning 21 Aug. for a 31 Oct. harvest (Table 1). Days to first harvest usually ranged from 75–80 d for October to December harvests, 80–90 d for January through April harvests, and 75–85 d for May harvests. Plantings continued until late February for mid-May harvests. Sometimes the planting schedule had to be compromised after early December because of limited available space. In this situation, scheduled plantings sometimes had to be either reduced in size or skipped for a week until more space became available for planting.

GROWING THE CROP AND PEST MANAGEMENT. Weed pressure has increased dramatically over the past three seasons because end-of-season weeds were allowed to go to seed. Since emergence and early growth of cabbage is relatively slow, it does not compete well with weeds. From August to mid-November, when

conditions were favorable (dry foliage and no wind), paraquat dichloride (Gramoxone Max, Syngenta Crop Protection, Inc., Greensboro, NC) was occasionally sprayed in alleyways and on bed shoulders of planted crops and on the tops of unplanted beds to control recently emerged weeds.

Crop protective chemicals were used as described in previous reports of our garden crops (Shuler et al., 2003a, 2003b, 2004a, 2004b, 2005a, 2005b, 2006a, 2006b). Our crop protective chemical program for insects usually provided excellent control of worms. Worms could have been a problem for cabbage, especially in the spring, as evidenced by the presence of egg masses on crop leaves. Scouting for pests was done at harvest. When pests were detected at harvest, younger plantings would be further examined and sprayed if needed. Aphids were only moderately attracted to cabbage.

Even though multiple seeds were planted per hill, plant stand was sometimes less than adequate during periods of low rainfall (resulting in low soil moisture levels in the surface germination zone). Plant stand was also less than adequate during periods of excessive rainfall and flooding when young seedlings were

killed by damping-off. Although excessive weed growth did not slow down harvest like it did with a leafy crop such as parsley where weed leaves would have been separated from the crop leaves, weeds in cabbage did slow down crop growth by shading. When growth was slowed, heads were small and took longer to mature. Weed leaves also limited air flow and created an environment for excessive dew. This moist environment sometimes contributed to leaf spots on wrapper leaves and older head leaves. These blemished leaves were peeled off at harvest. Small heads, soft (immature) heads, and heads with extra trimming were usually held for sale after good heads had been sold first. Fungicides were usually not used on cabbage. Cabbage was also subject to cracked heads from bolting. Bolting occasionally occurred when small heads were skipped in older plantings and allowed to size-up.

HARVESTING AND WASHING. On Friday, cabbage was usually the first or second crop harvested in the morning. On Saturday all crops were usually cut after sundown. Cabbage stems were cut below mid-aged wrapper leaves and outer leaves further trimmed off if needed to remove blemishes. Heads were carried in a wheelbarrow or by hand to the washing station where they were rinsed. Cabbage heads were stacked in a cooler with ice. Any cabbage left unsold at the Saturday market would be taken back home, placed in sales bags, and held in a household refrigerator until time for loading for the Sunday market.

MARKETING, PRICING, AND SALES TECHNIQUES. Our primary greenmarket outlets have been the Saturday market in West Palm Beach, FL (7 AM to 1 PM for 28 weeks, late October to late April), where we have sold produce since 1998 and the Sunday market in Stuart, FL (9 AM to 1 PM for 28 to 30 weeks, late October to early May) where we have sold produce since Spring 2003. Note: Hours for the West Palm Beach greenmarket (under new management in 2006–07) were reduced to 8 AM to 1 PM.

The demand for flat cabbage has remained fairly steady over the past 3 years. We have some “regular” customers who will buy cabbage whenever they shop at the market. Since many customers do not come to the market each week, there were some weeks when we would sell out and not have cabbage for these regular customers. To ensure that we would have cabbage for them, some customers would “pre-order” cabbage (pay this week for cabbage next week). For these customers, we would hold their order until they arrived. To be able to provide for pre-ordering, we would always look ahead to next week’s harvest to ensure a supply. There were times when we would harvest slightly immature (smaller and less dense) heads to meet the expected market demand.

Even though there was usually a range in size among cabbage heads, we did not weigh them at point of sale and over the past four seasons have maintained a base price of \$2.50 per head. When heads were very large, we would occasionally raise prices to \$3.00/head if supply was low. However, when supplies were adequate, we would usually maintain the price at \$2.50/head, which would reward early shoppers with a “bargain” for the large heads. When heads were very small, prices were lowered accordingly, especially if sales were slow. Free samples were not advertised with cabbage, but a leaf sample for tasting would be provided if requested. A display of two heads was maintained and replenished with cabbage from the storage cooler as needed.

PRODUCTION AND SALES FIGURES. Detailed production and sales figures were provided for the 2003–04 season (Table 2). This was our most productive season and was not affected by September

or October hurricanes as was the 2004–06 seasons. The greatest amounts of cabbage sold were at the 8 Feb. 2004 weekend when 24 heads were sold for \$48 and the 5 Mar. 2005 weekend when 21 heads were sold for \$52.50. A summary of seasonal cabbage production and sales is provided in Tables 3 and 4.

CUSTOMER PROFILE, OBSERVATIONS, AND CUSTOMER COMMENTS. A wide range of customers purchased vegetables from Stephen’s Produce. Customers included older retired couples, single men and women, young families with children, as well as winter residents from the northern United States, Canada, and Europe. Even though our flat cabbage was not a main item for many of our “regular” customers, many people who had tried our flat cabbage, said they preferred it and would not go back to purchasing regular round headed cabbage.

For customers who bought it, cabbage was usually one of several items purchased. Customers would usually buy one or two heads. Customers would often comment on the freshness of our cabbage and that it remained fresh after prolonged storage in the refrigerator. Most regular customers of flat cabbage would purchase it each time they shopped at the market.

Table 2. Flat cabbage sales for Stephen’s Produce at green markets in Southeast Florida, 2003–04.

Market weekend	Heads of Asian flat cabbage			
	Taken (no.)	Sold (no.)	Sales (\$)	Unsold (no.)
18 Oct.				
25 Oct.				
1 Nov.	9	8	\$24	1
8 Nov.	12	12	\$36	
15 Nov.	12	11	\$33	1
22 Nov.	1	1	\$3	
29 Nov.	9	4	\$8	5
6 Dec.	12	9	\$20	3
13 Dec.	13	10	\$22	3
20 Dec.	8	8	\$17	
27 Dec.	12	12	\$24	
3 Jan.	9	9	\$18	
10 Jan.	8	8	\$15	
17 Jan.	8	8	\$16	
24 Jan.	12	12	\$24	
31 Jan.	10	10	\$22	2
7 Feb.	25	24	\$48	1
14 Feb.	25	22	\$44	3
21 Feb.	19	19	\$40	
28 Feb.	12	10	\$20	2
6 Mar.	7	7	\$14	
13 Mar.	13	13	\$26	
20 Mar.	15	15	\$30	
27 Mar.	14	8	\$16	6
3 Apr.	19	15	\$30	4
10 Apr.	17	5	\$10	12
17 Apr.	15	15	\$30	
24 Apr.	19	18	\$36	1
2 May	7	6	\$7.5	1
9 May	7	6	\$12	1
15 May	9	5	\$10	4
21 May	8	6	\$12	2
Total	368	316	\$667.50	52
Avg/wk 30 weeks	12.3	10.5	\$22.25	1.7

Table 3. Summary of flat cabbage sales for Stephen's Produce at green markets in Southeast Florida over a 4-year period, 2003–07.

Season	Location	Harvest and sales season	Weeks sold (no.)	Heads taken (no.)	Heads sold (no.)	Sold per wk (no.)	Avg price per head (\$)	Total sales value (\$)	Sales value per wk (\$)	Heads unsold (no.)	Unsold (% of total taken)
2003–04	WPB, PBG ² , Stuart	2 Nov. –22 May	30	368	316	10.5	\$2.11	\$667.50	\$22.25	52	14.1%
2004–05	WPB, Wellington, Stuart	17 Dec. –15 May	22	251	239	10.9	\$2.40	\$573	\$26.05	12	4.8%
2005–06	WPB, Stuart	14 Dec. –15 May	23	280	252	11.0	\$2.44	\$616	\$26.78	28	10%
2006–07	WPB, Stuart	21 Oct. –28 Apr.	25	284	273	10.9	\$2.34	\$638	\$25.52	11	3.9%

²West Palm Beach, FL.

³Palm Beach Gardens, FL.

Table 4. Summary of flat cabbage production by Stephen's Produce for sale at green markets in Southeast Florida over a 4-year period, 2003–07.

Season	Harvest and sales season	Wks planted (no.)	Linear bed ft per planting	Avg days to harvest	Median harvest days	Seeded that were harvested (%)	Within-row plant spacing (inches)	Heads harvested (no.)	Heads sold (no.)	Value sold (\$)	\$/Acre	\$/Acre per day
2003–04	2 Nov. –22 May	28	7.6 ^v	84–103	94	81%	11.0	368	316	\$668	\$35,895	\$348
2004–05	17 Dec. –15 May	18	7.4 ^s	84–95	90	87%	11.6	251	239	\$573	\$40,379	\$423
2005–06	14 Dec. –15 May	25	7.8 ^w	86–95	91	69%	11.5	280	252	\$616	\$31,996	\$338
2006–07	21 Oct. –28 Apr.	25	7.1 ^w	82–91	87	76%	11.3	284	273	\$638	\$43,926	\$481

^vBased on days to final harvest.

^sNineteen plantings with two rows per bed; nine plantings with three rows per bed.

^wSixteen plantings with two rows per bed; two plantings with three rows per bed.

^xAll plantings with two rows per bed.

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