

Growing and Marketing Collards and Kale at Local Green Markets in Southeast Florida

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Collards (*Brassica oleracea* var. *viridis* L.) were first grown in 2002 and kale (*Brassica oleracea* var. *sabellica* L.) in 2004 in the 0.38-acre backyard market garden of Stephen's Produce. It was one of 30 crops being grown to help supply local green markets with a weekend supply of "garden fresh" produce. Planting schedules, growing and harvesting methods, yields, and sales figures will be discussed. For the 2007–08 season, five plantings of collards and eight plantings of kale were made. Collards and kale were sold at all but one of the 28 weekends for the sales season, which began 20 Oct. and concluded 27 Apr. Young collard and kale leaves were broken off plants, bundled, banded, and stored in a cooler with ice the day before sales. Bunches of 18–30 collard leaves were generally sold for \$2.00 to \$3.00 each. Bunches of 16–22 kale leaves were generally sold for \$1.50 to \$2.00 each. In 2002–03, an average of 15 bunches of collard greens were sold each week. In 2004–05, an average of 21 bunches of kale were sold each week.

THE BEGINNING OF COLLARD SALES FOR GREEN MARKETS IN SOUTHEAST FLORIDA, 2002–08. The growers for Stephen's Produce were the first vendors to offer collard greens, 2002, and kale, 2004, for sale at green markets in Southeast Florida. Our regular customers were already getting other leafy salad greens from Stephen's Produce: cilantro, Italian parsley, lettuce, arugula, Swiss chard, mizuna, bekana, mache, garden cress, and spinach (Shuler et al., 2003a, 2003b, 2004a, 2005a, 2006a, 2006b). We were looking for new crops to grow and sell since the garden had continued to be expanded and there was not a need to greatly expand production of existing crops. There is no large-scale commercial production of collards and kale in Southeast Florida. After collard greens and kale were introduced at the greenmarket in West Palm Beach, at least one other produce vendor began growing and selling them as well. Three to five consecutive weekly plantings of collards (cv. Champion, Johnny's Selected Seeds, Winslow, ME) and kale (cv. Winterbor, Johnny's Selected Seeds, Winslow, ME) were made each summer beginning in late Aug. to have these crops for sale at the first market in late October. Red kale (cv. Redbor, Johnny's Selected Seeds, Winslow, ME) was grown and sold for one season, 2005–06. Beginning in 2006–07, the green kale cv. was changed to 'Blue Armor' (Otis S. Twilley Seed Co., Hodges, SC). Collards and kale are related to cabbage; collards might be described as a non-heading cabbage (Fig. 1). They are biennials grown as annuals and are used as winter greens in the South. Collard plants produce a rosette of leaves. The whole rosette may be cut off and marketed, the usual commercial practice. For market, the whole plant of kale is cut off and trimmed. For home use, leaves of collards and kale are stripped off, and the plant continues to produce. They are used as greens or potherbs. Kale is also used as feed for livestock (Markle et al., 1998).

SOIL PREPARATION, IRRIGATION SETUP, AND MANAGEMENT. Garden soil preparation, broadcast fertilization, bed making, and irrigation



Fig. 1. Collard greens grown at Stephen's Produce local produce market in Palm Beach County, FL. Collards might be described as a non-heading cabbage.

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).

CROPESTABLISHMENT WITH DIRECT SEEDING. A 1% chlorpyrifos mole cricket bait (Micro Flo, Memphis, TN) used to control wire worms and cutworms and approximately 80–67 lb/acre N and K, respectively, from mixing equal amounts of potassium nitrate and ammonium nitrate was sprinkled on the bed top just before seeding. 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. Collards and kale (Fig. 2) were planted two rows per bed with 2 to 4 seeds per hill at a within row spacing of approximately 9–12 inches for collards and 6–8 inches for kale. Loose soil was pulled over

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Fig. 2. Kale plantings Stephen's Produce local produce market in Palm Beach County, FL.

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 18 to 24 d, hills were thinned to one plant. One season collards and kale were grown on beds covered with polyethylene plastic mulch. 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.

GARDEN SPACE MANAGEMENT AND CROP SCHEDULING. Once the initial plantings of collards and kale were established in late summer, leaves could be harvested continually until mid-March. For these August plantings, days to first harvest averaged 48 to 52 d for both collards and kale. As space became available, several additional late fall or winter plantings of both crops were made to provide for new crop harvests in the spring. For these later plantings, days to first harvest averaged 80 d for collards and 50 to 65 d for kale.

GROWING THE CROP AND PEST MANAGEMENT. Weed pressure has increased dramatically over the past four seasons because end-of-season weeds were allowed to go to seed. Since emergence and early growth of collards and kale is relatively slow, they do 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 the alleyways and on bed shoulders of planted crops and on the tops of unplanted beds to control recently emerged weeds. For the cruciferous crops, a pre-emergence herbicide, DCPA (Dacthal W-75, AMVAC, Los Angeles, CA) was used for the first time in the 2007–08 season. Spray was directed to the bed top and sides using a Solo back pack sprayer at 50 gal per acre using a flat fan nozzle. Soil organic matter content ranged from 7% to 9% and necessitated use of the high rate of 14 lbs Dacthal W-75 per acre. DCPA was sprayed either immediately after planting or the next morning for plantings completed after dark. Soil moisture to activate the herbicide was provided by the normal drip irrigation schedule and not by overhead irrigation as suggested by the herbicide

label. Rainfall, when it occurred shortly before or after herbicide application, enhanced the weed control provided by DCPA. In general, early weed control of most targeted weeds was enhanced by the herbicide application. However, hand weeding was still required later during the season as weeds continued to emerge and grow. After several months of growth both crops provided some shading which helped slow weed growth.

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, 2007a, 2007b). Our crop protective chemical program for insects usually provided excellent control of worms. Worms could have been a problem for both collards and kale, especially in the spring, as evidenced by the presence of egg masses on crop leaves. Scouting for pests was done at harvest and when pests were detected, younger plantings would be further examined and sprayed if needed.

Whiteflies were a favorite pest of both collards and kale and not of most other crops which were grown in the garden. Whenever aphids were noticed on other crops (usually during late fall, winter, and early spring), imidicloprid (Pravado 1.6 Flowable, Bayer, Research Triangle Park, NC) and pymetrozine (Fulfill, Syngenta, Greensboro, NC) would be added to the worm control chemical in a weekly rotation to provide aphid control. Whenever it was used, imidicloprid would help control the whiteflies. However, the whitefly populations would continue to increase and ultimately overwhelm the plants. Even though new leaves were still being produced, they would become unmarketable because of stickiness from honeydew, discoloration from sooty mold, and the physical presence of both whitefly larva and adults. Also, leaves which were heavily colonized by whitefly larva would often have a lighter green coloration than normal leaves. Furthermore, when whitefly populations began to make their dramatic increase in the spring, crops adjacent to the collard and kale plantings would also become infected with adult whiteflies.

HARVESTING AND WASHING. Harvesting was non-destructive. For the first several years, leaves were harvested from each planting every third or fourth week. Note: Usually three or four plantings were available for harvest at any given time. However, for the 2007–08 season, leaves were generally harvested from every planting each week.

On Friday, collard greens and kale were usually the fourth and fifth crop harvested in the morning and on Sat. all crops were usually harvested after sundown. These two crops were usually harvested early to mid morning while they were still turgid. Mature leaves would be broken off near the main stem and gathered in one hand until enough were collected to make a "bunch." The bunches were wrapped with a rubber band near the ends of the stems and the stems cut square at the end. Since the leaves were generally held off the ground by the plant, bunches were usually stored immediately in coolers with ice without being washed. Bunches of collard greens usually contained from 18 to 30 leaves while bunches of kale usually had 16 to 22 leaves. Bunches of collard greens were usually laid flat in the coolers while bunches of kale were often stacked upright and squeezed side by side. This would allow for a small amount of water to be added to the bottom of the cooler to help keep the kale hydrated. Any collard greens or kale left unsold at the Sat. 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. The primary greenmarket outlets for produce from Stephen's Produce have

been the Saturday market in West Palm Beach, FL (7 to 8 AM to 1 PM for 27 or 28 weeks, late October to late April since Fall 1998 and the Sunday market in Stuart, FL (9 AM to 1 PM for 28 to 30 weeks, late October to early May), since Spring 2003. The demand for collard greens is somewhat unpredictable and seems to fluctuate almost weekly. Even with our relatively large sized bunches, our “Southern” customers who know how to cook collard greens will often buy two or three bunches at a time. Very few bunches of collard greens are sold as impulse buys to customers who are unfamiliar with them. The demand for collard greens seems to have held fairly steady with the general demand of our other crops. The demand for kale decreased slightly to moderately over the past 2 to 3 years (as did most of our other crops due to a general decline in greenmarket sales). However, this past season, demand seemed to increase slightly as customers continue to become more health conscious. Some customers related using kale to make vegetable smoothies.

Collard greens were usually sold for \$2.00 to \$3.00 per bunch and kale was sold for \$1.50 to \$2.00 per bunch. One to two bunches were usually maintained on display and replenished with fresh bunches from the storage cooler as needed. Prices were usually not reduced in an attempt to sell more bunches; however, if the last bunch on display was wilted, it would often be sold at a reduced price.

PRODUCTION AND SALES FIGURES. Detailed production and

sales figures for collard greens were provided for the 2003–04 season (Tables 1 and 3). This was our most productive season and was not affected by September or October hurricanes as was the 2004–06 seasons. Production and sales figures for kale were provided for the 2007–08 season (Tables 2 and 3).

The greatest number of collard green bunches sold were for the 18 Jan. 2004 weekend when 28 bunches were sold for \$56 and for the 25 Jan. 2003 weekend when 26 bunches were sold for \$52. The greatest number of kale bunches sold was for the weekend of 23 Apr. 2005, when 32 bunches were sold for \$48 and for the 12 Mar. 2005 weekend when 31 bunches were sold for \$46.50. A summary of seasonal collard and kale production and sales is provided in Tables 4–7.

CUSTOMER PROFILE, OBSERVATIONS, AND CUSTOMER COMMENTS.

A wide range of customers purchased vegetables at the green markets. Customers included older retired couples, single men and women, young families with children, as well as winter residents from the northern USA, Canada, and Europe.

For some customers, collard greens was the only item purchased with many customers buying two or more bunches. Kale was often one of several leafy green items purchased with some customers buying two bunches. Customers would often comment on the freshness of our collard greens and kale. Some of our regular customers of kale would have standing orders and buy it each time they shopped at the market.

Table 1. Collard green production from 0.011 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	Hills planted (no.)	Bunches harvested (no.)	Total value (\$) ^y	\$ Per acre	\$ Per acre per day ^y
	Start	Finish	Start	Finish							
27 Aug.	17 Oct.	10 Jan.	51	136	94	20	54	80	\$200	\$108,900	\$801
2 Sept.	24 Oct.	17 Jan.	52	138	95	20	56	84	\$210	\$114,594	\$830
10 Sept.	31 Oct.	23 Jan.	51	135	93	20	55	61	\$152	\$82,764	\$613
29 Oct.	24 Jan.	21 May	87	205	146	17	46	116	\$290	\$185,771	\$906
12 Nov.	30 Jan.	21 May	79	191	140	25	127	105	\$262	\$114,127	\$598
18 Nov.	7 Feb.	14 May	80	177	129	16	44	64	\$160	\$108,900	\$615
Totals			67	164	116	118		510	\$1,274	\$117,575	\$717
Avg for 6 plantings					19.7			85	\$212		
Avg for 32 weeks sales								16	\$39.81		

^zBased on \$2.50 per bunch if all bunches were sold.

^yCalculated by dividing “\$ per acre” by “Days to harvest—Finish.”

Table 2. Kale production from 0.0053 acres for sale at green markets in Southeast Florida, 2007–08.

Date planted	Harvest period (dates)		Days to harvest		Avg days to harvest	Linear bed ft planted ^z	Hills planted (no.)	Bunches harvested (no.)	Total value (\$) ^y	\$ Per acre	\$ Per acre per day ^y
	Start	Finish	Start	Finish							
4 Sept.	26 Oct.	19 Jan.	52	137	95	8	26	49	\$98	\$133,403	\$974
12 Sept.	9 Nov.	11 Jan.	58	121	90	6	20	23	\$46	\$83,490	\$690
17 Sept.	9 Nov.	21 Mar.	53	186	120	6	18	57	\$114	\$206,910	\$1,112
24 Sept.	10 Nov.	11 Jan.	47	109	78	6	19	16	\$32	\$58,080	\$533
27 Sept.	17 Nov.	18 Apr.	51	204	128	7	22	41	\$82	\$127,569	\$625
13 Nov.	4 Jan.	9 May	52	178	115	6	20	81	\$162	\$294,030	\$1,652
20 Nov.	12 Jan.	9 May	53	171	112	6	27	91	\$182	\$330,330	\$1,932
27 Nov.	18 Jan.	9 May	52	164	108	6	20	52	\$104	\$188,760	\$1,151
4 Dec.	25 Jan.	9 May	52	157	105	7	24	72	\$144	\$224,023	\$1,427
Totals			52	159	106	58	196	482	\$964	\$180,999	\$1,138
Avg for 9 plantings						6.4	21.8	53.6	\$107		
Avg for 29 weeks sales								16	\$39.81		

^zBased on \$2.00 per bunch if all bunches were sold.

^yCalculated by dividing “\$ per acre” by “Days to harvest—Finish.”

Table 3. Weekly sales of collard greens and kale for Stephen's Produce at green markets in Southeast Florida.

Market weekend	Collard greens, 2003–04 season				Market weekend	Kale, 2003–04 season			
	Taken (no.)	Sold (no.)	Sales (\$)	Unsold (no.)		Taken (no.)	Sold (\$)	Sales (no.)	Unsold (no.)
18 Oct.	8	8	\$16		20 Oct.				
25 Oct.	11	11	\$22		27 Oct.	2	2	\$4	
1 Nov.	9	9	\$18		3 Nov.	5	5	\$10	
8 Nov.	13	12	\$24	1	10 Nov.	9	9	\$18	
15 Nov.	9	8	\$16	1	17 Nov.	11	11	\$22	
22 Nov.	8	8	\$15		24 Nov.	10	10	\$20	
29 Nov.	14	9	\$18	5	1 Dec.	17	17	\$34	
6 Dec.	19	16	\$32	3	8 Dec.	16	16	\$32	
13 Dec.	19	13	\$26	6	15 Dec.	16	16	\$32	
20 Dec.	24	23	\$46	1	22 Dec.	15	12	\$24	3
27 Dec.	17	16	\$32	1	29 Dec.	15	15	\$30	
3 Jan.	15	15	\$30		5 Jan.	14	14	\$28	
10 Jan.	25	23	\$46	2	12 Jan.	22	22	\$44	
17 Jan.	28	28	\$56		19 Jan.	16	16	\$32	
24 Jan.	25	25	\$50		26 Jan.	22	22	\$44	
31 Jan.	23	15	\$30	8	2 Feb.	22	15	\$30	7
7 Feb.	23	22	\$44	1	9 Feb.	20	16	\$32	4
14 Feb.	15	12	\$24	3	16 Feb.	17	17	\$34	
21 Feb.	14	14	\$28		23 Feb.	21	15	\$30	6
28 Feb.	16	16	\$32		1 Mar.	19	19	\$38	
6 Mar.	15	15	\$30		8 Mar.	27	24	\$48	3
13 Mar.	18	15	\$30	3	15 Mar.	24	24	\$48	
20 Mar.	20	19	\$38	1	22 Mar.	20	15	\$30	5
27 Mar.	20	14	\$28	6	29 Mar.	18	13	\$26	5
3 Apr.	23	15	\$30	8	5 Apr.	19	13	\$26	6
10 Apr.	20	17	\$34	3	12 Apr.	21	21	\$42	
17 Apr.	20	20	\$40		19 Apr.	18	12	\$24	6
24 Apr.	26	15	\$30	11	26 Apr.	18	18	\$36	
2 May	12	5	\$10	7	3 May	14	11	\$22	3
9 May	7	2	\$4	5	10 May	14	10	\$20	4
15 May	9	8	\$16	1					
21 May	16	8	\$16	8					
Total	506	456	\$911	50	Total	482	430	\$860	52
	Avg/wk (32 weeks)					Avg/wk (29 weeks)			
	15.8	14.2	\$28.47	1.6		16.6	14.8	\$29.66	1.8
Percent unsold				9.9%					10.8%

Table 4. Summary of collard green sales for Stephen's Produce at green markets in Southeast Florida over a 6-year period, 2002–08.

Season	Location	Harvest and sales season	Wks sold (no.)	Collards taken (no.)	Collards sold (no.)	Sold per wk (no.)	Avg price per collard	Total sales value	Sales value per wk	Collards unsold (no.)	Unsold (% of total taken)
2002–03	WPB ² , PBG ³ , Stuart	19 Oct.–18 May	31	518	473	15.3	\$2.02	\$954	\$30.77	45	8.7%
2003–04	WPB ² , Wellington, Stuart	18 Oct.–22 May	32	506	456	14.3	\$2.00	\$911	\$28.47	50	9.9%
2004–05	WPB ² , Stuart	4 Dec.–15 May	24	272	257	10.7	\$2.42	\$621	\$25.88	15	5.5%
2005–06	WPB ² , Stuart	10 Dec.–14 May	23	143	140	6.1	\$2.49	\$348	\$15.13	3	2.1%
2006–07	WPB ² , Stuart	21 Oct.–31 Mar.	24	243	227	9.5	\$2.45	\$556	\$23.17	16	6.6%
2007–08	WPB ² , Stuart	27 Oct.–26 Apr.	27	254	235	8.7	\$2.47	\$581	\$21.51	19	7.5%

²West Palm Beach, FL.

³Palm Beach Gardens, FL.

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Table 5. Summary of kale sales for Stephen's Produce at green markets in Southeast Florida over a 4-year period, 2004–08.

Season	Location	Harvest and sales season	Wks sold (no.)	Kale taken (no.)	Kale sold (no.)	Sold per wk (no.)	Avg price per kale	Total sales value	Sales value per wk	Kale unsold (no.)	Unsold (% of total taken)
2004–05	WPB ^z , Stuart	12 Feb.–15 May	14	347	295	21.1	\$1.56	\$460	\$32.86	52	15%
2005–06 ^y	WPB ^z , Stuart	19 Nov.–22 Apr.	23	401	350	15.2	\$1.75	\$613	\$26.65	51	12.7%
2006–07	WPB ^z , Stuart	21 Oct.–28 Apr.	28	332	300	10.7	\$2.00	\$600	\$21.43	32	9.6%
2007–08	WPB ^z , Stuart	27 Oct.–10 May	29	479	430	14.8	\$2.00	\$860	\$29.66	49	10.2%

^zWest Palm Beach, FL.

^yTotals for green and red kale.

Table 6. Summary of collard production by Stephen's Produce for sale at green markets in Southeast Florida over a 6 year period, 2002–08.

Season	Harvest and sales season	Wks planted (no.)	Linear bed ft per planting	Avg days to harvest	Median harvest days	Within-row plant spacing (inches)	Collards (no.)		\$ Value sold	\$ Per acre	\$ Per acre per day
							Harvested	Sold			
2002–03	19 Oct.–18 May	18	8.53	63–125	94		518	473	\$954	\$67,664	\$541
2003–04	18 Oct.–22 May	6	19.7	67–164	116	8.7	506	456	\$911	\$83,932	\$512
2004–05 ^y	4 Dec.–15 May	6	18.7	74–160	117	9.2	272	257	\$621	\$60,274	\$377
2005–06 ^x	10 Dec.–14 May	2	22	60–197	129	8.7	143	140	\$348	\$86,130	\$437
2006–07	21 Oct.–31 Mar.	4	17	49–191	120	11.7	243	227	\$556	\$89,042	\$466
2007–08	27 Oct.–26 Apr.	4	18.8	62–217	140	3.5	254	235	\$581	\$84,361	\$389

^xCalculated by dividing “\$ per acre” by “Days to harvest—Finish.”

^ySix early plantings lost to Hurricanes Frances and Jeanne.

^zSome damage to first plantings from Hurricane Wilma.

Table 7. Summary of kale production by Stephen's Produce for sale at green markets in Southeast Florida over a 4 year period, 2004–08.

Season	Harvest and sales season	Wks planted (no.)	Linear bed ft per planting	Avg days to harvest	Median harvest days	Within-row plant spacing (inches)	Kale (no.)		\$ Value sold	\$ Per acre	\$ Per acre per day
							Harvested	Sold			
2004–05	12 Feb.–15 May	7	6.9	52–108	80	6.6	347	295	\$460	\$104,363	\$966
2005–06 ^{yx}	19 Nov.–22 Apr.	4	10	53–168	111	8.4	272	224	\$392	\$106,722	\$635
2006–07	21 Oct.–28 Apr.	7	6.9	52–144	98	7.7	332	300	\$600	\$136,125	\$945
2007–08	27 Oct.–10 May	9	6.4	52–159	106	7.1	479	430	\$860	\$161,472	\$1,016

^xCalculated by dividing “\$ per acre” by “Days to harvest—Finish.”

^ySome damage to first plantings from Hurricane Wilma.

^zProduction figures calculated for green kale only; red kale was also grown and sold.

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