



Growing and Marketing Dandelion Greens at Local Green Markets in Southeast Florida, 2003–2011

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The growers for Stephen's Produce grew and marketed dandelion greens from 2003 to 2011 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. Dandelion, *Taraxacum officinale* F. H. Wigg, was grown from 2003 to 2009. Beginning in 2009–2010, an Italian dandelion, *Cichorium intybus* L., cultivar Clio was grown. For the 2010–2011 season, four plantings were made on 26 Aug., 12 Oct., 23 Nov., and 5 Jan. Dandelion seeds were direct seeded and seedlings thinned to one or two plants per hill. Dandelion greens were cut, bunched, and sold on 27 weekends from 23 Oct. to 8 May. An average of eight bunches were sold each week at \$2.25 per bunch or \$18 per week and \$475 for the season.

THE BEGINNING OF DANDELION GREENS SALES FOR GREEN MARKETS IN SOUTHEAST FLORIDA, 2003–2011. In 2003, the growers for Stephen's Produce may have been the first vendors to offer dandelion greens for sale at green markets in Southeast Florida. Regular customers of Stephen's Produce were already getting other leafy greens from them: cilantro, Italian parsley, lettuce, arugula, Swiss chard, mizuna, bekana, mache, garden cress, spinach, and collards (Shuler et al., 2003a, 2003b, 2004a, 2005a, 2006a, 2006b, 2008, 2009a, 2009b). The growers 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 was no large-scale commercial production of dandelion greens in Southeast Florida. After dandelion greens were introduced at the greenmarket in West Palm Beach, at least one other produce vendor began growing and selling them as well. The first planting of dandelion was usually made in late August so that greens would be available for sale at the first market in late October. Several additional plantings were made throughout the fall and early winter to provide greens throughout the spring marketing season which usually ended in late April or early May. From 2003–2007 and 2008–2009 dandelion greens were grown from an unnamed cultivar (Johnny's Selected Seeds, Winslow, ME). From 2009–2011, the Italian dandelion cv. 'Clio' was grown (Johnny's Selected Seeds, Winslow, ME). Dandelion was not grown in the 2007–2008 season.

Dandelion is a common weed pest in lawns and gardens throughout the US. It is a European native perennial plant whose low spreading leaves form a rosette pattern. The leaves are used in salads and as a cooking green and the flowers are used in wine-making (Stephens, 1988). Italian dandelion is a chicory and similar to endive (Markle et al., 1998).

SOIL PREPARATION, IRRIGATION SETUP AND MANAGEMENT, 2003–2007. Garden soil preparation, broadcast fertilization, bed making, and irrigation setup and management for 2003–2007 was handled similar to other crops reported in previous papers (Shuler et al., 2003a, 2003b, 2004a, 2004b, 2005a, 2005b, 2006a, 2006b).

SOIL PREPARATION AND MANAGEMENT, 2008–2011. Compost had been applied to the entire garden each summer until the summer of 2007 when it was not applied for the first time. Since 2007, the only soil amendments had been the accumulated garden debris (weeds, unused crop foliage, roots, and soil) which was spread over a small area of the garden each summer. By 2007–2008, overall garden production had declined. Until 2008 all cultivation had been limited to roto-tilling soil approximately 5–6 inches deep. Ca concentrations in the soil had become very high probably due to the Ca in the previously added compost and to high concentrations of Ca in the well water used for drip irrigation. Increased weed pressure had also reduced crop growth and quality.

Since 2008, the garden had been plowed once each spring/summer to a depth of 6–9 inches with a moldboard plow which brought up fresh soil to mix with the zone of compost/soil (one bottom 12-inch moldboard plow pulled by a 1980 Yanmar 1610 3-cylinder diesel tractor rated at 19 hp). The garden area continued to be roto-tilled to help mix in the broadcast fertilizer and to help level the soil before beds were made. Since 2008 a set of tractor mounted bedding disks was used to help throw up soil for making beds. This eliminated the use of a push plow to throw up soil for bed making. However, the soil still needed to be raked up on both sides and firmed up by walking on the bed top and sides to complete the bed making process. Since 2010, the garden was disked multiple times in the spring/summer with a three-point hitch mounted 5-ft disk. Disking was used to knock down the beds at the end of the season as well as to break up debris after end-of-season crops and weeds had been killed with glyphosate herbicide (Roundup Ultra, Monsanto, St. Louis, MO). Disking was also done to cultivate the soil after plowing. This further reduced the need for roto-tilling.

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CROP ESTABLISHMENT WITH DIRECT SEEDING. For 2007–2010, approximately 80–67 lb/acre N and K, respectively, from mixing equal amounts of KNO_3 and NH_4NO_3 was sprinkled on the bed top just before seeding. For the 2010–2011 season, NH_4SO_4 and $2\text{MgSO}_4 \cdot \text{K}_2\text{SO}_4$ were used to provide the N and K. A 1% chlorpyrifos mole cricket bait (Micro Flo, Memphis, TN) used to control wire worms and cutworms was also sprinkled on the bed top and incorporated along with the fertilizer by using the cultivator attachment of a wheel-hoe which was pushed forward as the cultivator attachment was moved up and down. This also served to loosen up the soil where the rows would be made. Because dandelion seeds need light for germination, they were planted very shallow. The rows were not opened with a hoe; instead, the row area was rolled with an automobile tire to firm up the soil and small indentations were made every 8–9 inches with the handle end of a hoe. Multiple seed were hill planted in the indentations and very lightly covered with soil. The row area was rolled a second time with the tire. Even though they did not have the light requirement, Italian dandelion seeds were planted in a similar fashion in 2009–2011. After approximately 14 to 21 d, hills were thinned to one or two seedlings. For two seasons, 2005–2007, dandelions were grown on beds covered with polyethylene plastic mulch.

Even though multiple seeds were planted per hill, plant stands were sometimes less than adequate during periods of low rainfall (resulting in low soil moisture levels in the surface germination zone). Plant stands were also less than adequate during periods of excessive rainfall and flooding when young seedlings were killed by damping-off. Dandelion seeds were purchased once in 2003 and this seed was used for all subsequent plantings. Seeds were stored under refrigeration when they were not being used on planting days; however, refrigeration was interrupted for approximately 10 d in both 2004 and 2005 because of hurricanes. Only a few seedlings emerged in 2006 and 2008 which may have been due to having older, weakened seed. The Italian dandelion seeds germinated quickly and seedlings usually emerged in 3–4 d.

GARDEN SPACE MANAGEMENT AND CROP SCHEDULING. Once the initial plantings of dandelions were established in late summer, leaves could be harvested continually until April. For these August plantings, days to first harvest ranged from 45 to 65 d. As

space became available, several additional late fall and winter plantings were made to provide new, tender leaves for harvest in the spring. For plantings made in December, days to first harvest averaged 80–90 d.

GROWING THE CROP AND PEST MANAGEMENT. Weed pressure has increased dramatically over the past seven seasons because end-of-season weeds were allowed to go to seed. Since emergence and early growth of dandelions was relatively slow, they did 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. A pre-emergence herbicide, DCPA (Dacthal W-75, AMVAC, Los Angeles, CA) was used for the first time in the 2007–2008 season for the cruciferous crops, beans, and onions, but it was not used for dandelions. Plantings of dandelions were hand weeded. Weeding would usually be made at thinning and before first harvest. If time allowed, additional weeding would be made before or after later harvests.

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). The crop protective chemical program for insects usually provided excellent control of worms. Worms could have been a problem for dandelions, 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 and aphids were occasional pests of dandelion. Whenever aphids were noticed on other crops (usually during late fall, winter, and early spring), imidacloprid (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, imidacloprid would also help control whiteflies.

Bolting was a common occurrence with dandelion and made harvesting more difficult. Bolting was much less of a problem for Italian dandelion, but did occur in April for an October planting.

HARVESTING AND WASHING. Harvesting was non-destructive.

Table 1. Dandelion green production from 0.005 acres for sale at green markets in Southeast Florida, 2003–2004.

Date planted	Harvest period (dates)		Days to harvest		Duration of harvest (d)	Harvests (no.)	Days between harvests	Linear bed ft planted	Bunches (no./plot)	Bunches (no./acre)	Bunches (no./acre) per day ^z
	Start	Finish	Start	Finish							
21 Aug.	24 Oct.	27 Mar.	64	219	155	7	26	6	54	98,010	448
28 Aug.	31 Oct.	10 Apr.	64	226	162	7	27	6	49	88,935	394
22 Sept.	7 Nov.	1 May	46	222	176	8	25	6	48	87,120	392
28 Sept.	21 Nov.	8 May	54	223	169	9	21	8	79	107,539	482
16 Oct.	13 Dec.	21 May	58	218	160	7	27	6	67	121,605	558
22 Oct.	20 Dec.	24 Apr.	59	185	126	5	32	6	42	76,230	412
28 Oct.	9 Jan.	26 Mar.	73	150	77	3	39	6	22	39,930	266
5 Nov.	14 Feb	12 Mar.	101	128	27	2	27	4.5	13	31,460	245
13 Nov.	9 Jan.	14 May	57	183	126	7	21	6	79	143,385	783
Total								54.5	453		
Avg for 9 plantings			64	195	131	6.1	27	6	50	90,517	464
Avg for 31 weeks sales									14.6		

^zCalculated by dividing “bunches per acre” by “days to harvest - finish”.

Table 2. Weekly sales of dandelion greens at greenmarkets in Southeast, Florida, 2003-2004.

Market weekend	Bunches			Sales (\$)
	Taken to market (no.)	Sold (no.)	Unsold (no.)	
25 Oct.	8	8		\$16.00
1 Nov.	4	4		\$8.00
8 Nov.	7	7		\$10.00
15 Nov.	9	9		\$13.50
22 Nov.	8	2	6	\$3.00
29 Nov.	4	1	3	\$1.50
6 Dec.	6	6		\$9.00
13 Dec.	13	10	3	\$15.00
20 Dec.	15	13	2	\$19.50
27 Dec.	6	6		\$9.00
3 Jan.	11	11		\$16.50
10 Jan.	18	18		\$27.00
17 Jan.	22	22		\$27.00
24 Jan.	23	23		\$34.00
31 Jan.	19	18	1	\$27.00
7 Feb.	22	22		\$33.00
14 Feb.	20	15	5	\$22.50
21 Feb.	12	12		\$18.00
28 Feb.	19	19		\$28.50
6 Mar.	15	15		\$22.50
13 Mar.	19	19		\$28.50
20 Mar.	18	18		\$27.00
27 Mar.	28	25	3	\$37.50
3 Apr.	15	15		\$22.50
10 Apr.	16	13	3	\$19.50
17 Apr.	23	23		\$34.50
24 Apr.	30	23	7	\$34.50
2 May	10	10		\$15.00
9 May	10	10		\$15.00
15 May	11	6	5	\$9.00
21 May	12	8	4	\$12.00
Total	453	411	42	\$616.00
Avg/wk 31 weeks	14.6	13.3	1.4	\$19.87
\$ per bunch				\$1.50
Percent unsold			9.3%	

For the 2003–04 season which had 12 plantings of dandelions, leaves were harvested from a couple of plantings every third or fourth week. Usually three or four plantings would be available for harvest on any given weekend. However, for the 2005–2006, 2006–2007, and 2008–2009 seasons, which had two, one, and one plantings, respectively, leaves were generally harvested from only a third of the plants each week. This allowed up to 3–4 weeks for leaves to re-grow from the whorl.

On Friday, dandelions were usually one of the last crops harvested at night and on Saturday all crops were usually harvested after sundown. Before plants began to bolt, all leaves from a plant might be gathered up and cut at once. Some leaves from an additional plant or plants would usually be added to make up a bunch. Bunches were wrapped with a rubber band near the stem end and stems cut again to square off the end. Since the leaves grew low to the ground, they were often dirty (especially when heavy rainfall caused soil to be splattered up onto the leaves). If needed, bunches were washed before being stored in a cooler with ice. Any dandelion greens 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.

Leaves of Italian dandelion grew much more upright than those of the common dandelion. Italian dandelion leaves were also generally longer and thicker. Because of the upright and robust growth habit, Italian dandelions greens could be harvested twice as quick as the common dandelion, and one bunch could often be made from a single cut of all leaves from one plant.

MARKETING, PRICING, AND SALES TECHNIQUES. The primary greenmarket outlets for produce from Stephen's Produce were the Saturday market in West Palm Beach, FL (7 or 8 AM to 1 PM for 27 or 28 weeks, late October to late April) and the Sunday market in Stuart, FL (9 AM to 1 PM for 28 to 30 weeks, late October to early May). The demand for dandelion greens was relatively low; however, there was a small group of customers who would usually always buy one or more bunches of dandelion greens whenever they shopped at the market. Most of the dandelion production was targeted for the West Palm Beach market and Stephen's Produce often sold out of dandelion greens at that market. In the years when production was limited, sales at the Stuart greenmarket on Sunday would be primarily from orders taken via telephone, email or prepaid at the market a week ahead.

Table 3. Italian dandelion greens production from 0.0044 acres for sale at green markets in Southeast Florida, 2009–2010.

Date planted	Harvest period (dates)		Days to harvest		Duration of harvest (d)	Harvests (no.)	Days between harvests	Linear bed ft planted	Bunches harvested (no.)	Bunches per acre	Bunches per acre per day ^z
	Start	Finish	First	Last							
26 Aug.	16 Oct.	9 Apr.	51	225	174	24	7.6	18	152	91,960	409
14 Oct.	18 Dec.	6 Apr.	65	184	119	17	7.4	18	83	50,215	273
8 Dec.	13 Mar.	1 May	95	144	49	7	8.2	12	21	19,058	132
Total								48	256		
Avg for 3 plantings			70	184	114	16	7.7	16	85	58,080	316
Avg for 28 weeks sales									9.1		

^zCalculated by dividing "bunches per acre" by "days to harvest – last".

Table 4. Weekly sales of Italian dandelion greens at greenmarkets in Southeast, Florida, 2009–2010.

Market weekend	Bunches			Sales (\$)
	Taken to market (no.)	Sold (no.)	Unsold (no.)	
17 Oct.	10	10		\$20
24 Oct.	10	10		\$20
31 Oct.	11	11		\$22
7 Nov.	8	8		\$16
14 Nov.	9	9		\$18
21 Nov.	10	10		\$20
28 Nov.	6	4	2	\$8
5 Dec.	10	10		\$20
12 Dec.	11	11		\$22
19 Dec.	9	9		\$18
26 Dec.	8	8		\$16
2 Jan.	9	8	1	\$16
9 Jan.	6	2	4	\$4
16 Jan.	4	4		\$8
23 Jan.	5	5		\$10
30 Jan.	7	7		\$14
6 Feb.	8	8		\$16
13 Feb.	7	6	1	\$12
20 Feb.	9	9		\$18
27 Feb.	9	9		\$18
6 Mar.	9	9		\$18
13 Mar.	11	11		\$22
20 Mar.	7	7		\$14
27 Mar.	10	10		\$20
3 Apr.	10	10		\$20
10 Apr.	15	15		\$30
17 Apr.	9	9		\$18
24 Apr.	6	6		\$12
1 May	5	4	1	\$8
Total	248	239	9	\$478
Avg/wk 28 weeks				\$17
\$ per bunch				\$2.00
Percent unsold			3.6%	

A few bunches of dandelions were sold as impulse buys to customers who were unfamiliar with them but who were looking for another leafy green to cook or juice. The demand for dandelion greens has increased slightly as customers do more juicing and have become more health conscious.

In recent years, dandelion greens have been sold for \$2.00 to \$2.50 per bunch. A single bunch was usually maintained on display and replaced by a fresh bunch from the storage cooler as needed. However, many regular customers would request a fresh bunch from the cooler. Since they wilted fairly quickly, dandelion greens would often not be displayed. Instead, the price sign would remain on the display with a note to “Ask for fresh.” 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 dandelion greens were provided for the 2003–04 season (Tables 1 and 2) and for Italian dandelion for the 2009–2010 season (Tables 3 and 4). These were our most productive seasons and were not affected by September or October hurricanes as was the 2004–06 seasons.

The greatest number of dandelion bunches sold were for the 28 Mar. 2004 weekend when 25 bunches were sold for \$1.50 per bunch or \$37.50 total. The greatest number of Italian dandelion bunches sold was for the weekend of 10 Apr. 2010 when 16 bunches were sold for \$2.00 per bunch or \$32 and for the 7 May 2011 weekend when 14 bunches were sold for \$2.50 per bunch or \$35.00. A summary of seasonal dandelion production and sales is provided in Tables 5 and 6.

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 U.S., Canada, and Europe.

For a few customers, dandelion greens was the only item purchased with a few customers buying two or more bunches. Dandelion greens was often one of several leafy green items purchased. Customers would often comment on the freshness of the dandelion greens and the large size of the bunches.

Table 5. Summary of dandelion greens production by Stephen’s Produce for sale at green markets in Southeast Florida over an 8-year period, 2003–2011.

	Date of	Harvest	Wks	Linear bed ft		Bunches		Avg days		Bunches	Total	Value	Value
	first	and sales	planted	per		harvested	Bunches	to harvest		per acre	value of	per acre	per acre
Season	planting	season	(no.)	planting	Total	(no.)	per acre	First	Last	per day ^z	sales (\$)	(\$)	(\$) ^y
2003–04	21 Aug.	18 Oct.–22 May	9	6	54.5	453	90,517	64	195	464	\$616	\$123,087	\$631
2004–05 ^x	4 Oct.	11 Dec.–15 May	7	9.7	68	248	39,716	69	155	256	\$441	\$70,622	\$456
2005–06 ^w	4 Oct.	7 Jan.–14 May	2	11.5	23	155	73,389	95	218	337	\$293	\$138,730	\$636
2006–07	7 Oct.	30 Dec.–28 Apr.	1	18	18	71	42,955	83	203	212	\$148	\$89,540	\$441
2007–08		--- Did not grow dandelion greens ---											
2008–09	23 Oct.	1 Feb.–26 Apr.	1	15	15	35	25,410	86	184	138	\$34	\$24,684	\$134
2009–10 ^v	26 Aug.	17 Oct.–2 May	3	16	48	248	56,265	70	184	306	\$466	\$105,735	\$575
2010–11 ^v	26 Aug.	23 Oct.–8 May	4	18.5	74	226	33,259	78	157	212	\$475	\$69,920	\$445

^xCalculated by dividing “bunches per acre” by “avg. days to harvest – last.”

^wCalculated by dividing “\$ per acre” by “avg. days to harvest – last.”

^vSix early plantings lost to Hurricanes Frances and Jeanne.

^wSome damage to first plantings from Hurricane Wilma.

^vItalian dandelion, cv. ‘Clio,’ previous seasons were common dandelion.

Table 6. Summary of dandelion greens sales for Stephen's Produce at green markets in Southeast Florida over an 8-year period, 2003–2011.

Season	Location	Harvest and sales season	Weeks sold (no.)	Dandelion taken (no.)	Dandelion sold (no.)	Sold per week (no.)	Avg price per bunch	Total sales value	Value per wk (\$)	Dandelion unsold (no.)	Unsold (% of total taken)
2003–04	WPB ^z Wellington Stuart	18 Oct.–22 May	31	453	411	13.3	\$1.50	\$616	\$19.87	42	9.3%
2004–05 ^y	WPB ^z Stuart	11 Dec.–15 May	23	248	225	9.8	\$1.96	\$441	\$19.17	22	8.9%
2005–06 ^y	WPB ^z Stuart	7 Jan.–14 May	19	155	146	7.1	\$2.00	\$293	\$15.42	9	5.8%
2006–07	WPB ^z Stuart	30 Dec.–28 Apr.	18	70	64	3.6	\$2.31	\$148	\$8.22	6	8.6%
2007–08	--- Did not grow dandelion greens ---										
2008–09	WPB ^z Stuart	1 Feb.–26 Apr.	12	35	35	2.9	\$1.05	\$37	\$3.08	0	0
2009–10 ^w	WPB ^z PBG ^x Stuart	17 Oct.–2 May	28	248	239	8.5	\$2.00	\$478	\$17.07	9	3.6%
2010–11 ^w	WPB ^z Stuart	23 Oct.–8 May	27	226	225	8.3	\$2.11	\$475	\$17.59	1	0.4%

^zWest Palm Beach, Fla.^yEarly production and sales affected by hurricanes.^xPalm Beach Gardens, Fla.^wItalian dandelion, cv. 'Clio,' previous seasons were common dandelion.

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