

## GROWING AND MARKETING CHINESE RADISHES AND TURNIPS AT LOCAL GREEN MARKETS IN SOUTHEAST FLORIDA

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*Additional index words.* compost, farmers' market, garden

**Abstract.** Stephen's Produce began in 1995 as a 0.03 acre market garden to supply the Jupiter Farms Green Market with a Saturday supply of "garden fresh" produce. The garden was expanded each year. In 2003-2004, 0.35 acres were under cultivation and clientele were being served at two weekend green markets. Chinese radishes and turnips were two of the 26 crops grown and have been included in the crop mix for four seasons. Planting schedules, growing and harvesting methods, yields, and sales figures will be discussed. For the 2003-2004 season, 31 plantings were scheduled to correspond to the 31 week sales season beginning 18 Oct. and ending 16 May. Average days to harvest were 57 days for radish and 48 days for turnips. Chinese radishes were sold at \$1-2 per radish and turnips were sold at \$1 per bunch containing usually 2 to 4 turnips. Turnip bunch size varied with size of turnip and availability. An average of 21 radishes was sold each week for \$26.34 (\$1.25 per radish) or \$626 per acre per day. An average of 92 turnips (2.4 turnips per bunch) was sold each week for \$37.58 or \$536 per acre per day.

*The Beginning of Chinese Radish and Turnip Sales for Green Markets in Southeast Florida, 2000-2004.* Chinese (daikon) radishes (*Raphanus sativus*) had first been offered for sale in the 1998-99 season by another vendor at the West Palm Beach green market. That vendor, who was associated with a commercial Chinese cabbage grower, stopped selling produce at the end of the 2000 season. Since we offered Chinese cabbage and red radishes for sale, we would often get inquiries asking if we grew the large white radishes (Shuler et al., 2001a, b). We decided to try to satisfy this market request and made three test plantings of 'Mijashige' Chinese radish in January and February 2001. The variety 'R-71804' (Johnny's Selected Seeds, Winslow, Maine) was grown in 2002-03 and the variety 'Everest' was grown in 2003-04 (seed provided by C&B Farm, Immokalee, Fla.).

The 'Hakurei' variety of turnip (*Brassica rapa*) (Johnny's Selected Seeds, Winslow, Maine) had been suggested by Dr. Betsy Lamb (Indian River REC, Ft. Pierce, Fla.) as a mildly sweet and crunchy variety which could be eaten raw. It would complement red radishes, another root crop which we were already growing. 'Hakurei' is a Korean variety which produces large white roots.

*Soil Preparation.* Garden preparation began in mid May shortly after harvest of spring crops were completed by pulling out the remaining vegetation (mostly weeds). Weeds which emerged over the summer were controlled by spraying with glyphosate (Roundup Ultra, Monsanto Company, St. Louis, Mo.) herbicide. The garden has been enlarged each season and is now 0.35

acres (37 raised beds approximately 100 ft long) (Shuler et al., 2003a, b). Compost from the Palm Beach County Solid Waste Authority, locally available horse bedding/manure, and garden debris from the previous season were spread over the garden area each year, May-Aug. This past season 234 cubic yards of compost were spread over the garden to a depth of about 5 inches. Dolomitic limestone and broadcast fertilizer were spread and incorporated with a rotary tiller in Aug. Tilling also mixed the compost in with the underlying sand.

For the 2003-2004 season, 37 beds were formed in August and September to provide some protection from flooding after heavy rains. The beds ran north and south, were on 4 ft centers, and were approximately 5 to 6 inches high with 20 to 30 inch wide tops. Beds were made with a hand pushed wheel-hoe using the plow attachment. For each bed, multiple passes of the wheel-hoe were made. Starting where the bed was being formed, soil was thrown to the inside as each pass of the wheel-hoe was moved to the outside by a few inches. A rake was used to pull loose soil away from the alley area and up onto the sides and top of each bed. The loose soil on top was then raked level and the sides and top of the beds were walked on to firm up the loose soil so that the beds would not be worn down by rainfall.

*Irrigation.* For the 2000-01 season, each bed was fitted with a single line of Queen Gil International drip tape ("High Flow" tape with 4 inch emitter spacings rated at 64 gal per 100 ft/h). The lines were laid on the bed surface and divided into two zones (9 and 11 beds each) which could be irrigated separately using a manual flow meter with an automatic shut-off. Untreated well water was used without filtering. Ball shut-off valves were attached to each line to allow for individual bed irrigation. Also, a household paper element sediment filter was added in-line to reduce emitter plugging by sediment.

For the 2001-02 season, battery powered automatic timers were used to turn water on and off in each zone (Melnor Electronic Aqua Timer, Melnor, Winchester, Va.). By having the drip line on the bed surface, it could be lifted easily and shifted between rows to accommodate crops planted 3 or 4 rows per bed. Because of the constrictions of having hose bibs as shut-off valves and the pressure drop across the sediment filter, only about 25% of the garden could be irrigated at once while maintaining the minimum 7 psi recommended for the drip tubing. Pressure was measured with a gauge attached to the far end of one drip line. The automatic timers were set to irrigate every 8 to 12 h at 30 to 45 min per cycle. The two zones were set to irrigate at different times and only half of the 21 shut-off valves were open at any one time. The shut-off valves were manually switched after each irrigation, so the entire garden was irrigated once every 16 to 24 h.

For the 2002-03 season, a 100 mesh screen in-line sediment filter was used and the plumbing was reworked with 3/4 inch PVC pipe to eliminate the hose bib constrictions. "Medium Flow" Queen Gil International drip tape was used with 4 inch emitter spacings (rated at 32 gal per 100 ft/h). The garden irrigation setup remained in two zones of 12 and 13 beds each zone and each zone was irrigated at a different time. During high evapotranspiration periods in September

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and early October, each zone was irrigated three times per day for up to 45 min. each irrigation. Irrigation was reduced to as little as two times at 30 min each during cold periods in January and February. Timely irrigation was especially important for maintaining growth of newly emerged seedlings which needed constant and adequate surface moisture. The drip system was shut off after moderate to heavy rains.

For the 2003-04 season a second drip line was added to each bed to eliminate the need to physically move the drip line from side to side to accommodate crops planted 3 to 4 rows per bed. Also, a third irrigation zone was made to accommodate the 12 new beds.

*Crop Establishment with Direct Seeding.* Chlorpyrifos 1% bait (Mole Cricket Bait, Micro Flo Company LLC, Memphis, Tenn.) was sprinkled on the bed surface to control wire worms and cutworms (Shuler et al., 2002b). Approximately 250 lb/acre 23-0-23 topdress fertilizer was also spread at this time (providing 57 lb/acre N and 49 lb/acre K and made from mixing 50% potassium nitrate with 50% ammonium nitrate). The row areas of the bed surface were loosened with the cultivator attachment of the wheel-hoe and raked level to further incorporate the insecticide and fertilizer amendments.

The handle end of a hoe was pushed into the loose soil to make holes for hill planting the radishes and turnips. At first,

Chinese radishes were planted with a minimum two seeds per hill, in hills spaced 7 to 9 inches apart. After observing that usually 100% of the radishes emerged, seeding was reduced in 2003-04 to one seed per hill. Since turnip seeds were relatively small, accurate metering of two seed per hill was more difficult and sometimes four or five seed would be planted in each hill. Hills were spaced 2.5 to 4 inches apart. Also, beginning in the 2003-04 season, planting holes were no longer made for turnip seeds. Instead, a furrow was opened and an attempt was made to sow the seed by dropping fewer seed every 2.5 to 3 inches. Seeds were covered to a depth of about 1/2 to 3/4 inch. After planting, an automobile tire was rolled over the plant row to firm up the soil. Ten to 14 d after planting, seedlings were thinned to one plant per hill usually by pulling out the extra plants. If thinning was done later when seedlings were larger, extra plants were usually cut with scissors or a knife so that the root system would not be disturbed, thus protecting the plant that was left to grow. When grown alone, radishes and turnips were usually planted two rows per bed; however, on wide beds they would occasionally be planted three rows per bed. Since both crops grew quickly and were relatively tall crops, they would often be grown in single rows on beds with single rows of beans or longer season crops such as single rows of trellised snow peas

Table 1. Chinese radish production for Stephen's Produce for green markets in Southeast Florida, 2002-2003 season.

Date planted	Harvest period	Days to harvest	# hills seeded	# harv.	% harv.	Linear bed feet planted	With-in row spacing (inches)	Roots harvested per acre
22 Aug.	18 Oct.	57	30	0	0	7	5.6	0 <sup>z</sup>
27 Aug.	25 Oct.	59	30	20	67	7	5.6	31,114 <sup>y</sup>
3 Sept.	1 Nov.	59	26	21	81	7	6.5	32,670
9 Sept.	8 Nov.	60	24	22	92	7	7	34,226
15 Sept.	15 Nov.	61	25	22	88	7	6.7	34,226 <sup>x</sup>
21 Sept.	22 Nov.	62	26	24	92	7	6.5	37,337
26 Sept.	29 Nov.	64	26	21	81	7	6.5	32,670
3 Oct.	6 Dec.	64	26	20	77	7	6.5	31,114 <sup>w</sup>
9 Oct.	13 Dec.	65	22	21	95	6	6.5	38,115
14 Oct.	20 Dec.	67	26	25	96	7	6.5	38,893
21 Oct.	27 Dec.-24 Jan.	67-95	35	18	51	10.5	7.2	18,669 <sup>v</sup>
28 Oct.	3 Jan.	68	26	22	85	6.5	6	36,858
3 Nov.	10 Jan.	68	20	20	100	6	7.2	36,300
10 Nov.	17 Jan.	68	26	26	100	7.5	6.9	37,752 <sup>w</sup>
17 Nov.	24 Jan.-8 Feb.	68-83	28	21	75	6	7.7	38,115 <sup>sw</sup>
24 Nov.	24 Jan.-31 Jan.	61-68	20	21	105	5.5	6.6	41,580
1 Dec.	7 Feb.	68	25	25	100	7	6.7	38,893
8 Dec.	14 Feb.	68	22	21	95	7	7.6	32,670
16 Dec.	21 Feb.-7 Mar.	67-81	21	20	95	6	6.9	36,300 <sup>v</sup>
22 Dec.	21 Feb.-7 Mar.	61-75	22	20	91	7	7.6	31,114
29 Dec.	23 Feb.-7 Mar.	56-68	24	25	104	9	9	30,250
5 Jan.	14 Mar.	68	22	17	77	7	7.6	26,447
12 Jan.	14 Mar.-21 Mar.	61-68	20	20	100	8	9.6	27,225
21 Jan.	21 Mar.-28 Mar.	59-66	18	17	94	6	8	30,855
27 Jan.	28 Mar.-4 Apr.	60-67	18	17	94	5.5	7.3	33,660
3 Feb.	4 Apr.-3 May	60-89	25	24	96	6	5.8	43,560
10 Feb.	5 Apr.-11 Apr.	54-60	24	24	100	8	8	32,670
19 Feb.	12 Apr.-3 May	52-73	23	22	96	7	7.3	34,226
25 Feb.	18 Apr.-25 Apr.	52-59	28	27	96	10	8.6	29,403
Totals			708	603		204.5		
Average of 29 plantings		62-68	24	21	85	7.1	7	32,111

<sup>z</sup>Glyphosate drift injury.

<sup>y</sup>Soft rot on shoulder.

<sup>x</sup>Mostly small.

<sup>w</sup>Mostly large.

<sup>v</sup>Shaded by snow peas.

(Shuler et al., 2002a, b). The beans and peas could take advantage of the extra space once the turnips or radishes were harvested.

*Crop Scheduling.* Chinese radishes and turnips were generally planted on a weekly basis to allow for weekly harvests. Because of seasonal differences in growth rates, late summer

Table 2. Chinese radish sales for Stephen's Produce at green markets in Southeast Florida, 2002-2003.

West Palm Beach	# radish taken	# radish sold	Total \$	Average \$/radish	Time sold out	# radish unsold or given away
19 Oct.	0	0	0	0		
26 Oct.	20	20	13	0.65	11:10 AM	
2 Nov. <sup>z</sup>	21	9	7	0.78		12
9 Nov.	22	20	23	1.15	11:35 AM	2
16 Nov. <sup>z</sup>	22	12	18	1.50		10
23 Nov. <sup>y</sup>	24	14	21	1.50		10
30 Nov.	21	14	18	1.29	11:40 AM	7
7 Dec. <sup>z</sup>	20	11	16.5	1.50		9
14 Dec. <sup>z</sup>	21	15	19	1.27		6
21 Dec. <sup>y</sup>	25	22	27	1.23		3
28 Dec.	21	15	18	1.20		6
4 Jan.	22	22	25	1.14	12:55 PM	
11 Jan.	20	20	25	1.25	10:50 AM	
18 Jan.	26	19	22	1.16		7
25 Jan.	16	13	15	1.15	11:20 AM	3
1 Feb.	15	13	15	1.15	11:20 AM	2
8 Feb.	25	23	33	1.43	11:20 AM	2
15 Feb.	21	16	26	1.63		5
22 Feb.	18	15	15	1.00		3
1 Mar.	16	12	16	1.33		4
8 Mar. <sup>w</sup>	26	9	13.5	1.50		17
15 Mar.	20	16	24	1.50		4
22 Mar.	17	11	18	1.64		6
29 Mar.	17	5	7.5	1.50		12
5 Apr.	21	17	25	1.47		4
12 Apr.	20	20	30	1.50	12:20 PM	
19 Apr. <sup>y</sup>	20	15	27	1.80		5
26 Apr. <sup>z</sup>	20	9	11.5	1.28		11
Total	557	417	529	1.27		140
Avg per wk 28 weeks	20.6	15.4	19.60	1.27		5
Palm Beach Gardens	# radish taken	# radish sold	Total \$	Average \$/radish	Time sold out	# radish unsold or given away
19 Jan.	5	5	4	0.80		
26 Jan.	6	6	6	1.00		
2 Feb.	4	4	4	1.00		
9 Feb.	12	12	7	0.58		
16 Feb.	4	4	3	0.75		
23 Feb.	3	3	3	1.00		
2 Mar.	7	4	6	1.50		3
9 Mar.	15	13	9	0.69		2
16 Mar.	8	6	9	1.50		2
23 Mar.	6	6	9	1.50		
30 Mar.	10	10	13	1.30		
6 Apr.	12	8	13	1.63		4
Stuart	# radish taken	# radish sold	Total \$	Average \$/radish	Time sold out	# radish unsold or given away
13 Apr.	7	7	9	1.29		
20 Apr. <sup>w</sup>	9	6	7	1.17		3
27 Apr.	10	9	11.50	1.28		1
4 May	8	7	5	0.71		1
11 May						
18 May						
Total	126	110	118.50			16
Avg per wk 16 weeks	7.9	6.9	7.40	1.08		1

<sup>z</sup>Sales affected by rain or overcast conditions.

<sup>y</sup>The Saturday before Thanksgiving, Christmas, and Easter.

<sup>w</sup>WPB Boat Show took parking spaces.

<sup>w</sup>Easter Sunday.

plantings were scheduled 7 d apart, fall plantings at 5 to 6 d intervals, and winter plantings for spring harvest at 7-10 day intervals. The schedule had to be compromised in Nov. when there was no free space left to plant. Planting then continued on a weekly basis in areas where crops had just been harvested. Occasionally a scheduled planting was skipped in Feb. or Mar. to accommodate the faster growth rate of the spring crop. When we started selling at the Sunday markets in 2003, several radishes and turnips from each week's planting would be left for harvest for the Sunday market. If we did not sell out Saturday, we would take the left over produce to Sunday's market, leaving some extra radishes and turnips in the garden for the next Saturday market. There were also times, because of excessive shading and/or poor uniformity, that all roots from a planting would be harvested for the Saturday market. If there weren't enough unsold roots left over, then roots from the next week's planting would be harvested early for the Sunday market.

For the 2003-04 season, Chinese radishes and turnips were available for sale at the first market of the season in late

October and were available for 31 of the 32 remaining market dates. For radishes, days to first harvest varied from 45 d for a 10 Mar. planting harvested 24 Apr. to 66 d for a 14 Oct. planting harvested 19 Dec. For turnips, days to first harvest varied from 37 d for a 10 Mar. planting harvested 16 Apr. to 53 d for an 18 Nov. planting harvested 10 Jan. For Chinese radishes, average days to harvest averaged 57 d and for turnips, averaged 49 d. The last plantings for the 2003-04 season were made on 23 Mar. for radishes and 30 Mar. for turnip for the last market on 22 May. More refinements for crop scheduling are planned for next season.

*Growing the Crop and Pest Management.* There is commercial production of Chinese radishes by two large Chinese cabbage growers in Palm Beach County. There is no commercial production of turnips in Southeast Florida. The insecticide bait treatments made just before planting have been very effective for controlling wire worms and cutworms.

The most common weed problem for the 2003-2004 season was pigweed with moderate populations of purslane, nut-

Table 3. Chinese radish production for Stephen's Produce for green markets in Southeast Florida, 2003-2004 season.

Date planted	Harvest period	Days to harvest	# hills seeded	# harv.	% harv.	Linear bed feet planted	With-in row spacing (inches)	Roots harvested per acre
21 Aug.	16 Oct.-17 Oct.	56-57	33	31	94	9.5	6.9	35,536
27 Aug.	18 Oct.-31 Oct.	52-65	31	23	74	9	7	27,830
2 Sept.	31 Oct.-7 Nov.	59-66	31	25	81	9	7	30,250
7 Sept.	1 Nov.-7 Nov.	55-61	31	24	77	8.5	6.6	30,748
14 Sept.	7 Nov.-14 Nov.	54-61	33	30	91	9	6.5	36,300
20 Sept.	15 Nov.-28 Nov.	56-69	36	21	58	11	7.3	20,790
26 Sept.	28 Nov.	63	34	20	59	10.5	7.4	20,743
2 Oct.	5 Dec.-6 Dec.	64-65	32	28	88	10	7.5	30,492
8 Oct.	12 Dec.-19 Dec.	65-72	30	30	100	9	7.2	36,300
14 Oct.	19 Dec.-3 Jan.	66-81	32	26	81	10	7.5	28,314
20 Oct.	13 Dec.-3 Jan.	54-75	27	9	33	9	8	10,890
27 Oct.	13 Dec.-27 Dec.	47-61	32	24	75	10.5	7.9	24,891
5 Nov.	27 Dec.-9 Jan.	52-65	26	20	77	9	8.3	24,200
13 Nov.	2 Jan.-9 Jan.	50-57	23	25	109	7.5	7.8	36,300
18 Nov.	9 Jan.-16 Jan.	52-59	18	19	106	6	8	34,485
25 Nov.	17 Jan.-24 Jan.	53-60	21	21	100	6	6.9	38,115
9 Dec.	20 Feb.	73	20	3	15	6	7.2	5,445 <sup>z</sup>
16 Dec.	6 Feb.	52	22	0	0	6	6.5	0 <sup>z</sup>
23 Dec.	6 Feb.-14 Feb.	45-53	21	21	100	6.5	7.4	35,183
30 Dec.	20 Feb.-21 Feb.	52-53	32	26	81	8	6	35,393 <sup>y</sup>
6 Jan.	27 Feb.-28 Feb.	52-53	30	23	77	8	6.4	31,309 <sup>z</sup>
13 Jan.	5 Mar.-6 Mar.	52-53	32	26	81	8	6	35,393 <sup>z</sup>
21 Jan.	12 Mar.-13 Mar.	51-52	30	25	83	9	7.2	30,250 <sup>z</sup>
29 Jan.	19 Mar.-20 Mar.	50-51	33	32	97	10	7.3	34,848 <sup>z</sup>
4 Feb.	26 Mar.-27 Mar.	52-53	30	27	90	6	7.2	49,005 <sup>x</sup>
11 Feb.	2 Apr.-3 Apr.	51-53	31	29	94	9	7	35,090 <sup>w</sup>
19 Feb.	8 Apr.-10 Apr.	49-51	31	29	94	9	7	35,090
25 Feb.	16 Apr.-17 Apr.	51-52	30	27	90	9	7.2	32,670
3 Mar.	23 Apr.-24 Apr.	51-52	27	24	89	8	7.1	32,670
10 Mar.	24 Apr.-8 May	45-59	28	26	93	7	6	40,449
17 Mar.	8 May-14 May	51-57	18	18	100	6	8	32,670
23 Mar.	14 May-21 May	52-59	22	19	86	7	7.6	29,559 <sup>zw</sup>
Totals			907	731		266		
Average of 32 plantings		54-60	28	22.8	81	8.3	7.1	29,927

<sup>z</sup>Bolted.

<sup>y</sup>Small.

<sup>x</sup>Less bolting.

<sup>w</sup>Large.

Table 4. Chinese radish sales for Stephen's Produce at green markets in Southeast Florida, 2003-2004.

	# radish taken	# radish sold	Total \$	Average \$ per radish	Time sold out	# radish unsold or given away
West Palm Beach						
18 Oct.	24	20	21	1.05		4
25 Oct.	18	12	24	2.00		6
1 Nov.	20	18	34	1.89		2
8 Nov.	29	12	20	1.67		17
15 Nov.	24	13	13	1.00		11
22 Nov. <sup>z</sup>	17	15	15	1.00		2
29 Nov.	21	9	15	1.67		12
6 Dec.	20	14	14	1.00		6
13 Dec.	15	15	14	0.93		
20 Dec. <sup>z</sup>	22	15	15	1.00		7
27 Dec.	24	24	21	0.88	1:10 PM	
3 Jan.	18	18	18	1.00	1:00 PM	
10 Jan.	21	16	16	1.07		6
17 Jan.	12	12	12	1.00	11:45 AM	
24 Jan.	8	8	8	1.00	9:50 AM	
31 Jan. <sup>y</sup>	0	0	0			
7 Feb.	3	2	2	1.00	7:50 AM	1
14 Feb.	8	8	12	1.50		
21 Feb.	23	23	26	1.13	12:15 PM	
28 Feb.	18	18	12	0.67		
6 Mar.	18	17	150.82	0.88		1
13 Mar.	19	17	14	0.82		2
20 Mar.	19	18	19	1.06	12:00 PM	1
27 Mar.	19	10	15	1.50		9
3 Apr.	19	18	26	1.44		1
10 Apr.	20	17	25.5	1.50		3
17 Apr. <sup>z</sup>	20	20	30	1.50		
24 Apr.	22	22	36	1.64		
Total	501	410	493	1.20		91
Avg per wk 27 weeks	18.6	15.4	19.60	1.27		3.4
Wellington						
2 Nov.	10	8	14	1.75		2
9 Nov.	17	11	17	1.55		6
16 Nov.	13	0	0			13
23 Nov. <sup>x</sup>	14	5	5	1.00		9
30 Nov.	12	4	6	1.50		8
7 Dec.	7	5	5	1.00		2
14 Dec.	5	5	5	1.00		0
21 Dec. <sup>x</sup>	7	7	2	0.29		0
Total	85	45	54			40
Avg per wk 8 weeks	10.6	5.6	6.75	1.20		5
Stuart						
19 Oct.	13	9	12	1.33		4
26 Oct.	6	5	10	2.00		1
7 Dec.	7	6	6	1.00		1
14 Dec.	5	3	3	1.00		2
21 Dec. <sup>x</sup>	6	6	6	1.00		0
28 Dec.	10	9	8	0.89	11:25 AM	1
4 Jan.	11	11	8	0.73		0
11 Jan.	10	10	9	0.90	12:00 PM	0
18 Jan.	10	10	10	1.00	10:20 AM	0
25 Jan.	3	3	4.50	1.50		0
1 Feb.	0	0	0	0		0

<sup>z</sup>The Saturday before Thanksgiving, Christmas, and Easter.

<sup>y</sup>Sales affected by rain or overcast conditions.

<sup>x</sup>The Sunday before Thanksgiving, Christmas and Easter.

Table 4. (Continued) Chinese radish sales for Stephen's Produce at green markets in Southeast Florida, 2003-2004.

	# radish taken	# radish sold	Total \$	Average \$ per radish	Time sold out	# radish unsold or given away
8 Feb.	0	0	0	0		0
15 Feb. <sup>y</sup>	10	10	15	1.50		0
22 Feb.	6	6	3	0.50	10:30 AM	0
29 Feb.	5	5	4	0.80		0
7 Mar.	8	8	5	0.63		0
14 Mar.	6	6	5	0.83		0
21 Mar.	13	13	9	0.69		0
28 Mar.	16	16	24	1.50		0
4 Apr.	10	10	19	1.90		0
11 Apr.	11	7	14	2.00		4
18 Apr. <sup>x</sup>	7	7	9	1.29		0
25 Apr.	12	12	21	1.75		0
2 May	13	12	24	2.00		1
9 May	15	10	20	2.00		5
15 May	15	14	27	1.93		1
22 May	11	11	21	1.91		0
Total	239	219	297			20
Avg per wk 27 weeks	8.9	8.1	11.00	1.36		0.74

<sup>x</sup>The Saturday before Thanksgiving, Christmas, and Easter.

<sup>y</sup>Sales affected by rain or overcast conditions.

<sup>x</sup>The Sunday before Thanksgiving, Christmas and Easter.

sedge, and a few miscellaneous grasses. After the garden had been initially planted over by late Oct., areas for new radish and turnip plantings were made in spots where crops had just been harvested. Weeds and crop debris from harvesting were pulled out and removed to provide a "clean" planting area for the new plantings. Additional weeding for radishes and turnips was usually limited to pigweed which would sometimes grow over the top of the crops.

Foliar diseases were usually not a problem for radishes and turnips. Light infestations of bacterial leaf spots on older leaves were common during warm weather in fall and spring. Blemished older leaves on turnips were removed at harvest. Leaves produced during cooler weather from Jan. to early Apr. usually had fewer blemishes. Mefenoxam (Ridomil, Syngenta, Greensboro, N.C.), chlorothalonil (Bravo, Syngenta, Greensboro, N.C.), and azoxystrobin (Quadris,

Syngenta, Greensboro, N.C.) were used occasionally for disease control.

Root problems included bacterial soft rot which increased in severity after heavy rains and when irrigation was excessive. On the few occasions when soil was saturated from flooding, the growing point of radish roots would be killed and sometimes begin to rot. Splitting and cracking was a serious problem for the first plantings of turnips each season. In 2003-04, the first planting was completely lost to splitting and turnips from the second planting were harvested young to provide roots for the first market. Bolting was also a problem for 'Everest' Chinese radishes harvested from mid Feb. through late Mar. Since the radish tops were cut off, roots were still marketable; however, roots were much smaller than normal.

Crops were usually sprayed every 7 to 10 d with a rotation of spinosad (SpinTor, Dow Agrosciences, Indianapolis, Ind.),

Table 5. Summary of Chinese radish sales for Stephen's Produce at green markets in Southeast Florida over a four year period, 2000-2004.

Year	Location	Harvest/sales season	# of weeks	Total # radish taken	Total # radish sold	Radish sold/week	\$/radish	Total \$	\$/week
2000-01	WPB	17 Mar.-28 Apr.	7	144	114	16.3	\$0.87	\$99.50	\$14.21
2001-02	WPB	3 Nov.-27 Apr.	26	422	404	15.5	\$1.17	\$473.00	\$18.19
2002-03	WPB, PBG, Stuart	18 Oct.-17 May	31	598	527	17.0	\$1.23	\$647.50	\$20.89
2003-04	WPB, Wellington, Stuart	18 Oct.-22May	32	731	674	21.1	\$1.25	\$843.00	\$26.34

Table 6. Summary of production for Chinese radish grown by Stephen's Produce for sale at green markets in Southeast Florida over a four year period, 2000-2004.

Year	Harvest and sales season	# wks planted	Bed ft planted/wk	Plant spacing (inches)	Avg days to harvest	Total # radish	# radish/acre	Avg \$/radish	Avg \$/acre	\$/acre/day
2000-01	17 Mar.-28 Apr.	7	6.8	7.0	71	144	32,945	\$0.87	\$28,662	\$404
2001-02	3 Nov.-27 Apr.	25	5.1	6.7	61	422	36,243	\$1.17	\$40,592	\$642
2002-03	18 Oct.-17 May	31	7.1	7.0	65	603	32,111	\$1.23	\$39,496	\$579
2003-04	18 Oct.-22May	32	8.3	7.1	57	731	29,927	\$1.25	\$37,409	\$626

emamectin benzoate (Proclaim, Syngenta, Greensboro, N.C.), and indoxacarb (Avaunt, DuPont, Wilmington, Del.). These products were especially effective for worm control and worms never became a problem. Aphids were a recurring pest of both radishes and turnips and crops were sprayed on an as needed basis with either imidacloprid (Provado, Bayer Corporation, Kansas City, Mo.) or pymetrozine (Fulfill, Syngenta, Greensboro, N.C.).

*Harvesting and Washing.* Plants were either grabbed by the leaves near the top of the root or grabbed by the root and pulled out. For the first two seasons, 2000-02, the older, blemished leaves of both Chinese radishes and turnips were pulled off, leaving undamaged younger leaves. For the last two seasons, 2002-04, turnips continued to be sold with tops while radish tops were cut off leaving about one inch of stem at the top of the root. Both radish and turnip roots are white and

show soil readily. Organic matter in our soil forms a thin film of gray on the root surface. After pulling, the roots of both crops were carried to a screen bench where they were sprayed with a hose to remove any adhering soil. Roots were then rubbed by hand to loosen the film of organic matter and sprayed again to remove the film. Both crops were usually harvested either Friday morning or evening for Saturday sales and Saturday evening for Sunday sales. Harvesting in mid day was usually avoided since tops would often be slightly limp from water stress when temperatures were high. Roots with tops were laid horizontally in a Styrofoam cooler with usually one 7 lb bag of ice. Small roots and slightly blemished roots would be stacked in the bottom of the cooler with the larger, more appealing roots on top. This made display for sales easier since we would want to sell the "biggest and best" first. The Styrofoam coolers were loaded the night before for transport

Table 7. Turnip production for Stephen's Produce for green markets in Southeast Florida, 2002-2003 season.

Date planted	Harvest period	Days to harvest	# hills seeded	# harv.	% harv.	Linear bed feet planted	With-in row spacing (inches)	Roots harvested/ acre
31 Aug.	18 Oct.	48	120	30	25	17	5.1	19,218 <sup>zv</sup>
7 Sept.	25 Oct.	48	120	84	70	15	4.5	60,984 <sup>zs</sup>
14 Sept.	1 Nov.	48	124	84	68	16	4.7	57,173 <sup>zw</sup>
21 Sept.	8 Nov.	48	121	38	31	24	4.8	17,243 <sup>zv</sup>
28 Sept.	15 Nov.	48	121	80	66	16	4.8	54,450 <sup>vu</sup>
5 Oct.	22 Nov.	48	120	113	94	17	5.1	72,386
11 Oct.	29 Nov.	49	120	93	78	17	5.1	59,575 <sup>y</sup>
20 Oct.	6 Dec.	47	102	98	96	14	4.9	76,230 <sup>7</sup>
27 Oct.	13 Dec.	47	103	98	95	19	4.4	56,169 <sup>st</sup>
3 Nov.	20 Dec.	47	62	60	97	12	4.5	56,817
10 Nov.	27 Dec.-3 Jan.	47-54	80	78	98	19	5.7	44,706 <sup>st</sup>
17 Nov.	27 Dec.-10 Jan.	40-54	81	73	90	10	4.3	79,497
24 Nov.	17 Jan.	54	80	72	90	15	4.5	52,272 <sup>st</sup>
1 Dec.	24 Jan.-7 Feb.	54-68	100	81	81	19	4.4	47,681
8 Dec.	31 Jan.	54	80	82	102	16	4.8	55,811
16 Dec.	7 Feb.	53	71	67	94	14	4.6	54,047
22 Dec.	14 Feb.	54	78	78	100	18	5.5	47,190
29 Dec.	21 Feb.	54	84	76	90	12	5.1	68,970
5 Jan.	28 Feb.	54	105	98	93	25	5.6	43,560
12 Jan.	7 Mar.-21 Mar.	54-68	101	99	98	22	5.1	50,145
21 Jan.	14 Mar.	52	116	103	89	27	5.6	41,543
27 Jan.	21 Mar.-28 Mar.	52-59	103	89	86	21	4.8	47,279
3 Feb.	21 Mar.-28 Mar.	46-53	110	99	90	22	5.4	49,455
10 Feb.	28 Mar.-4 Apr.	47-54	74	67	91	10	4.9	72,963
19 Feb.	4 Apr.-5 Apr.	43-44	72	66	92	14	4.7	51,339
25 Feb.	11 Apr.-18 Apr.	45-52	117	105	90	26	5.2	44,841 <sup>r</sup>
5 Mar.	18 Apr.-25 Apr.	47-54	98	75	77	20	5.5	41,885
11 Mar.	19 Apr.-25 Apr.	39-45	47	43	91	10	5.1	46,827
19 Mar.	19 Apr.-3 May	31-45	90	81	90	18	4.8	49,005 <sup>y</sup>
Totals			2,800	2,310		204.5		
Average of 29 plantings		48-52	97	80	83	17.3	5.0	50,231
Average per week of sales (28 weeks)			100	82.5				

<sup>z</sup>Split.  
<sup>v</sup>Large.  
<sup>w</sup>Rough.  
<sup>x</sup>Too wet.  
<sup>y</sup>Soft rot.  
<sup>u</sup>Crack.  
<sup>7</sup>Med.  
<sup>r</sup>Small.  
<sup>s</sup>Shaded by peas.

to the green market in early morning. Sometimes turnips would fill an entire 155 quart cooler. Chinese radishes were usually mixed with other crops to fill a cooler.

*Marketing, Pricing, and Sales Techniques.* In addition to the green market in West Palm Beach, Fla., where Stephen's Produce has sold produce for the past six seasons, another market opened in January 2003 in Palm Beach Gardens, Fla. This was a Sunday market open from 9 am to 1 pm and was closer

to home than the West Palm Beach market. Stephen's Produce sold Chinese radishes at this market for 12 of 12 market Sundays from 19 Jan. to 6 Apr. when the market closed for the season. Turnips were only available for sale at the Palm Beach Gardens market for six of the 12 market Sundays. Another Sunday market also opened in Stuart, Fla. in 2003 and Stephen's Produce sold radishes and turnips at this market for four of six markets from 13 Apr. to 17 May 2003 when that

Table 8. Turnip sales for Stephen's Produce at green markets in Southeast Florida, 2002-2003.

West Palm Beach	# turnip taken	# turnip sold	Total \$	Avg turnip/\$	Time sold out	# turnips unsold or given away
19 Oct.	30	30	7	4.3	8:40	
26 Oct.	84	64	16	4		20
2 Nov. <sup>z</sup>	78	78	24.50	3.2	11:50	
9 Nov.	38	38	15.50	2.5	10:58	
16 Nov. <sup>z</sup>	75	72	23	3.1		3
23 Nov. <sup>y</sup>	113	102	29	3.5		11
30 Nov.	93	60	24	2.5		33
7 Dec. <sup>z</sup>	98	37	18	2.1		61
14 Dec. <sup>z</sup>	98	96	27	3.6		2
21 Dec. <sup>y</sup>	60	60	18	3.3	10:35	
28 Dec.	6	6	2	3	7:20	
4 Jan.	75	75	20	3.8	10:25	
11 Jan.	70	70	18	3.9	10:25	
18 Jan.	72	72	20	3.6	10:40	
25 Jan.	36	36	11	3.3	9:30	
1 Feb.	88	88	22	4	9:40	
8 Feb.	106	106	35	3	12:15	
5 Feb.	78	78	32	2.4	10:30	
22 Feb.	76	64	26	2.5		12
1 Mar.	98	97	35	2.8	10:30	1
8 Mar. <sup>x</sup>	74	71	29	2.5		3
15 Mar.	109	91	30	3		18
22 Mar.	91	88	32	2.8		3
29 Mar.	107	54	25	2.2		53
5 Apr.	101	86	35	2.5		15
12 Apr.	80	53	21	2.5		27
19 Apr. <sup>y</sup>	100	89	29	3.1		11
26 Apr. <sup>z</sup>	100	48	16	3		52
Total	2,234	1,909	\$640			325
Avg per wk 28 weeks	80	68	22.86	3		11.6
Palm Beach Gardens	# turnip taken	#turnip sold	Total \$	Avg turnip/\$	Time sold out	#turnips unsold or given away
23 Feb.	12	12	5	2.4		
9 Mar.	3	3	1	3		
16 Mar.	18	18	3	6		
23 Mar.	20	20	7	2.9		
30 Mar.	43	43	15	2.9		
6 Apr.	33	33	11	3		
Stuart	# turnip taken	# turnip sold	Total \$	Avg turnip/\$	Time sold out	# turnips unsold or given away
13 Apr.	27	27	8	3.4	12:30	
20 Apr. <sup>w</sup>	15	13	4	3.3		2
27 Apr.	52	50	16	3.1		2
4 May	25	23	11	2.1		2
Total	248	242	\$81			6
Avg per wk 10 weeks	25	24	\$8.10	3		0.6

<sup>z</sup>Sales affected by rain or overcast conditions.

<sup>y</sup>The Saturday before Thanksgiving, Christmas, and Easter.

<sup>w</sup>WPB Boat Show took parking spaces.

<sup>x</sup>Easter Sunday.



market closed. The Stuart market was also open from 9 am to 1 PM and was about the same distance from home as the market in West Palm Beach. In fall 2003 another Sunday market opened in Wellington, Fla. Stephen's Produce began selling at this market on their opening day, 2 Nov., until sales were discontinued on 21 Dec. because of low sales. Sunday sales were made at both Stuart and Wellington for three weekends, 7 Dec. to 21 Dec. and then continued at Stuart for the remainder of the season, ending on 22 May 2004.

Chinese radishes were priced individually based on size and the amount to be sold; prices ranged from \$.50 to \$2.50 per radish. Turnips were usually sold at \$1.00 per bunch and the number of turnips to make a bunch determined at the point of sale based on root size, usually two to four per bunch. For several market dates during spring 2004, turnips were so large that a bunch of two was sold at \$1.50. Since the 'Hakurei' turnip has a distinctive "sweet" taste, root samples were cut and offered to customers to taste. Whenever taste samples were of-

fered, sales of turnips usually increased. Sometimes single radishes would be larger than what customers wanted so we would cut roots in half for sale. Usually we would not have any trouble selling the remaining half. For several of our customers, Chinese radishes were a new vegetable which they had never tried before since these radishes are not typically sold at mainstream grocery stores. Since they were often unsure of how they would prepare them and how other family members would accept them, they would often buy the smaller roots.

A display area was made with five large coolers which were raised off the ground by portable stands to a height of 29 inches at the front edge and lined up with their tops opened and supported from behind to form an inclined platform of the inside top surface. The produce display was covered by a tent which helped shield the vegetables from sunlight. The coolers holding Chinese radishes and turnips were not used to make up the display area but were kept accessible to Stephen's Produce staff. We would keep the display stocked

Table 9. Turnip production for Stephen's Produce for green markets in Southeast Florida, 2003-2004 season.

Date planted	Harvest period	Days to harvest	# hills seeded	# harv.	% harv.	Linear bed feet planted	With-in row spacing (inches)	Roots harvested/acre
4 Sept.	17 Oct.	43	93	0	0	13.3	5.2	0 <sup>z</sup>
11 Sept.	17 Oct.-30 Oct.	35-49	142	111	78	13.3	3.4	90,886 <sup>y</sup>
19 Sept.	30 Oct.-1 Nov.	41-43	144	91	63	22.5	3.8	44,044
26 Sept.	6 Nov.-8 Nov.	41-43	102	90	88	18	4.2	54,450 <sup>x</sup>
3 Oct.	13 Nov.-20 Nov.	41-48	136	128	94	22.5	4.0	61,952 <sup>w</sup>
10 Oct.	20 Nov.	41	138	118	86	15	3.9	85,668 <sup>w</sup>
20 Oct.	3 Jan.-9 Jan.	75-81	126	103	82	22.5	4.3	49,852 <sup>x</sup>
26 Oct.	4 Dec.-13 Dec.	39-48	147	142	97	22.5	3.7	68,728 <sup>w</sup>
3 Nov.	19 Dec.-20 Dec.	46-47	152	134	88	16	3.2	91,204
5 Nov.	26 Dec.	51	100	95	95	16.5	4.0	62,700
13 Nov.	2 Jan.-3 Jan.	50-51	133	126	95	23	4.2	59,658 <sup>x</sup>
18 Nov.	10 Jan.	53	71	54	76	10.5	3.6	56,006
25 Nov.	16 Jan.-23 Jan.	52-59	126	114	90	19.5	3.7	63,665 <sup>vw</sup>
2 Dec.	23 Jan.-24 Jan.	52-53	56	43	77	6	3.9	78,045 <sup>w</sup>
9 Dec.	30 Jan.-14 Feb.	52-67	126	104	83	20	3.8	56,628 <sup>w</sup>
16 Dec.	6 Feb.-20 Feb.	52-66	117	101	86	15.5	4.1	70,961
23 Dec.	13 Feb.-14 Feb.	52-53	124	103	83	19	3.7	59,035 <sup>x</sup>
30 Dec.	20 Feb.-21 Feb.	52-53	95	76	80	9	3.4	91,960
6 Jan.	27 Feb.-5 Mar.	52-59	116	95	82	16	3.3	64,659
13 Jan.	27 Feb.-12 Mar.	45-59	127	117	92	18	3.4	70,785
21 Jan.	12 Mar.-13 Mar.	51-52	114	96	84	10	3.2	104,544
29 Jan.	19 Mar.-20 Mar.	50-51	124	109	88	18.5	3.6	64,163 <sup>x</sup>
11 Feb.	26 Mar.-2 Apr.	44-51	131	82	63	18	3.3	49,610 <sup>wt</sup>
19 Feb.	2 Apr.-9 Apr.	43-50	114	141	124	15.5	3.3	99,064 <sup>wvu</sup>
25 Feb.	8 Apr.-10 Apr.	43-45	100	92	92	13	3.1	77,068
10 Mar.	16 Apr.-17 Apr.	37-38	115	130	113	10	3.1	141,570 <sup>wu</sup>
10 Mar.	23 Apr.-24 Apr.	44-45	149	139	93	18	3.4	84,095
17 Mar.	24 Apr.-8 May	38-52	91	130	143	14	3.7	101,121
23 Mar.	8 May-14 May	46-52	99	62	63	11.5	4.2	58,711
30 Mar.	14 May-21 May	45-52	94	75	80	15	3.8	54,450
Totals			3,502	3,001		482.1		
Average of 30 plantings		47-52	117	100	86	16.1	3.7	67,786

<sup>z</sup>Split.  
<sup>y</sup>Cracked.  
<sup>x</sup>Large.  
<sup>w</sup>Small.  
<sup>v</sup>Shaded by peas.  
<sup>u</sup>Lack of thinning.  
<sup>t</sup>Clogged drip line.

Table 10. Turnip sales for Stephen's Produce at green markets in Southeast Florida, 2003-2004.

West Palm Beach	# turnips taken	# turnips sold	Total \$	Avg turnip/\$	Time sold out	# turnips unsold or given away
18 Oct.	22	22	7	3.1		
25 Oct.	50	50	15	3.3	12:15	
1 Nov.	69	47	17	2.8		22
8 Nov.	50	37	13	2.8		13
15 Nov.	100	79	21	3.8		21
22 Nov. <sup>z</sup>	137	66	13	5.1		71
29 Nov.	0	0	0			
6 Dec.	15	15	5	3.0		
13 Dec.	90	84	29	2.9		6
20 Dec. <sup>z</sup>	110	83	22	3.8		27
27 Dec.	95	75	32	2.3		20
3 Jan.	77	77	35	2.2	10:45	
10 Jan.	93	93	40	2.3		
17 Jan.	41	41	18	2.3	9:30	
24 Jan.	66	66	25	2.6	12:52	
31 Jan. <sup>y</sup>	24	24	6	4.0	8:10	
7 Feb.	98	98	35	2.8		
14 Feb.	82	82	56	1.5		
21 Feb.	88	75	27	2.8		13
28 Feb.	40	40	16	2.5		
6 Mar.	100	100	38	2.6		
13 Mar.	92	80	55	1.5		12
20 Mar.	70	70	46	1.5	12:10	
27 Mar.	60	60	28	2.1		
3 Apr.	50	50	16	3.2		
10 Apr.	115	115	38	3.0		
17 Apr. <sup>z</sup>	100	100	30	3.3		
24 Apr.	107	107	45	2.4		
Total	2,041	1,836	\$728			205
Avg/wk 27 weeks	75.6	68	\$26.96	2.5		7.6
Wellington	# turnips taken	# turnips sold	Total \$	Avg turnip/\$	Time sold out	# turnips unsold or given away
2 Nov.	37	37	16	2.3	12:30	
9 Nov.	53	36	12	3.0		17
16 Nov.	30	24	7	3.4		6
23 Nov. <sup>z</sup>	71	57	9	6.3		14
30 Nov.						
7 Dec.						
14 Dec.	20	16	5	3.2		4
21 Dec. <sup>z</sup>	27	27	6	4.5		
Total	238	197	55			41
Avg/wk 6 weeks	39.7	32.8	\$9.17	3.6		6.8
Stuart	# turnips taken	# turnips sold	Total \$	Avg turnip/\$	Time sold out	# turnips unsold or given away
19 Oct.	20	20	7	2.9		
26 Oct.						
7 Dec.						
14 Dec.	23	14	4	3.5		9
21 Dec.	24	24	6	4.0		
28 Dec.	20	20	7	2.9	11:35	
4 Jan.	51	51	24	2.1		
11 Jan.	54	54	36	1.5	12:00	
18 Jan.	27	27	13	2.1	11:15	
25 Jan.	23	23	10	2.3		
1 Feb.						

<sup>z</sup>The Saturday before Thanksgiving, Christmas, and Easter.<sup>y</sup>Sales affected by rain or overcast conditions.<sup>x</sup>Easter Sunday.

Table 10. (Continued) Turnip sales for Stephen's Produce at green markets in Southeast Florida, 2003-2004.

Stuart	# turnips taken	# turnips sold	Total \$	Avg turnip/\$	Time sold out	# turnips unsold or given away
8 Feb.	36	36	16	2.3	10:10	
15 Feb. <sup>y</sup>	46	30	20	1.5		16
22 Feb.	29	29	10	2.9	9:45	
29 Feb.						
7 Mar.	50	50	36	1.4		
14 Mar.	46	46	22	2.1		
21 Mar.	39	39	23	1.7		
28 Mar.	22	22	9	2.4		
4 Apr.	31	31	15	2.1		
11 Apr.	37	29	10	2.9		8
18 Apr. <sup>x</sup>	30	30	10	3.0		
25 Apr.	62	62	25	2.5		
2 May	58	38	16	2.4		20
9 May	54	32	16	2.0		22
15 May	64	59	29.50	2.0		5
22 May	40	40	17	2.4		
Total	886	806	\$381.50			80
Avg/wk 23 weeks	38.5	35	\$16.59	2.1		3.5

<sup>x</sup>The Saturday before Thanksgiving, Christmas, and Easter.

<sup>y</sup>Sales affected by rain or overcast conditions.

<sup>z</sup>Easter Sunday.

with several bunches and usually not allow customers to sort through radishes or turnips in the storage cooler. Any unsold radishes or turnips would be taken back home and kept in the cooler until Sunday morning for sales at the Sunday market or for give away on Monday.

Stephen's Produce was the only vendor for the 'Hakurei' turnip variety and usually the only turnip vendor. We were also usually the only vendor of Chinese radishes at any of the green markets over the four year period. Radishes were often sold one at a time; however, sometimes customers would buy two or three. Turnips were also often sold one bunch at a time, but it was not unusual to sell two or three bunches to a single customer, and a few customers would purchase five or six bunches. For some of our customers, Chinese radishes and/or turnips would be their only purchase.

*Production and Sales Figures.* Chinese radish sales averaged 15 to 20 roots per week for the four year period, 2000-2004

(Tables 1-4). Sales price for roots has increased from \$0.87 to \$1.25 per root and weekly value has increased from \$14 to \$26 or \$843 for the 2003-04 season. The greatest value of radishes sold was for the 25 Apr. 2004 weekend when 34 were sold for \$57. If grown two rows per bed, 8.75 linear bed ft is needed to grow 30 radishes when spaced 7 inches apart.

Turnip sales averaged 70 to 92 roots per week for the four year period, 2000-2004 (Tables 7-10). The number of roots to make a bunch (\$1.00 value) has ranged from 2.4 to 3. Weekly value has varied from \$25 to \$38 or \$1,165 for the 2003-04 season. The greatest value of turnips sold was for the 14 Mar. 2004 weekend when 126 were sold for \$77 (1.6 per bunch). If grown two rows per bed, 8.75 linear bed ft could provide 52 turnips spaced 4 inches apart. An area of 20 linear bed ft would be needed to grow 120 turnips at the same spacing.

At an average of 60 d to harvest, 30 radishes from 9 linear bed ft. selling at \$1.25 per radish would produce at a rate of

Table 11. Summary of turnip sales for Stephen's Produce at green markets in Southeast Florida over a four year period, 2000-2004.

Year	Location	Harvest and sales season	# weeks	Total # turnips taken	Total # turnips sold	Turnip Taken/wk	Turnip sold/wk	Avg turnip per \$	Total \$	\$/week
2000-01	WPB	4 Nov.-28 Apr.	26	2,068	1,815	79.5	69.8	2.7	\$681	\$26.19
2001-02	WPB	20 Oct.-27 Apr.	27	2,359	2,155	87.4	79.8	2.8	\$764	\$28.30
2002-03	WPB, PBG, Stuart	18 Oct.-17 May	29	2,287	2,151	78.9	74.2	3.0	\$721	\$24.86
2003-04	WPB, Wellington, Stuart	18 Oct.-22May	31	2,960	2,839	95.5	91.6	2.4	\$1,165	\$37.58

Table 12. Summary of production for turnips grown by Stephen's Produce for sale at green markets in Southeast Florida over a four year period, 2000-2004.

Year	Harvest and sales season	# wks planted	Bed ft planted/wk	Plant spacing (inches)	Avg days to harvest	Total # turnips	# turnips/acre	Avg turnip/\$	Avg \$/acre	\$/acre/day
2000-01	4 Nov.-28 Apr.	22	14.0	4.5	57.3	2,068	73,119	2.7	\$27,081	\$473
2001-02	20 Oct.-27Apr.	28	14.2	4.5	50.2	2,359	70,730	2.8	\$22,895	\$435
2002-03	18 Oct.-4 May	29	17.3	5.0	50.0	2,287	50,231	3.0	\$16,858	\$325
2003-04	18 Oct.-22May	30	16.1	3.7	49.0	2,960	67,789	2.4	\$27,793	\$536

\$756 per acre per d. At an average of 50 d to harvest, 120 turnips from 20 linear bed ft selling at 2.4 turnips per \$1 bunch would produce at a rate of \$545 per acre per d. Turnip production can be increased by 33% by planting three rows per bed; however, since each root is rubbed by hand, it takes longer to wash turnips than radishes.

A summary of Chinese radish production and sales for the past four market seasons, 2000-2004, is provided in Tables 5 and 6. A summary of turnip production and sales for the past four market seasons, 2000-2004, is provided in Tables 11 and 12.

*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 USA, Canada, and Europe.

We would encourage customers to eat radishes and turnips raw or to incorporate them into salads. They could also be steamed or cooked. When asked, customers would share how they prepared and ate these root crops. One popular use of Chinese radishes by European customers was to slice them partially through from two directions to make an "accordion" effect. Salt was sprinkled over the cut area and the radishes were served with beer. Customers often commented on the freshness and crunchiness of the roots. Customers were also encouraged to prepare the turnip leaves "Southern style" as boiled turnip greens or eat the leaves raw as a salad because they were so tender.

*Optimizing Production and Sales.* Several changes are planned for the coming season to increase the production efficiency of both Chinese radishes and turnips. A few low producing crops will be dropped which will allow for more "free" space in the garden. This should help eliminate the need to plant radishes and turnips in places where they are subject to shading (e.g., on the same bed as snow peas). An attempt will

be made to more precisely seed turnips so that fewer seeds are used per hill. This should allow for less disturbance of plants at thinning. The first plantings (usually early September) will be delayed several weeks to bypass the period when roots are most subject to splits and cracking.

Several different varieties of Chinese radish are planned for use next season to help prevent bolting which occurred with the 'Everest' variety in Feb. and Mar. this past season. We may experiment more with cutting radishes to the size customers request when we feel that a customer is hesitant to purchase a large radish which may be more than they can eat or want to pay for.

## Literature Review

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