Proc. Fla. State Hort. Soc. 122:199–205. 2009.

Growing and Marketing Hydroponic Lettuce at Local Green Markets in Southeast Florida

Kenneth D. Shuler*, Pei-Ann N. Shuler, Deanna V. Shuler, and Stephen J. Nie

Stephen's Produce, Jupiter, FL 33478

Additional index words. *Lactuca sativa*, float, hydroponic, farmers' market

The growers for Stephen's Produce began growing and marketing hydroponic lettuce in 2001 to help supply local green markets with a weekend supply of "garden fresh" produce. For the 2007–08 season, five types of lettuce (*Lactuca sativa* L.) were grown: Boston, Red Boston, redleaf, romaine, and a romaine/Boston type. Lettuce was sold at all of the 30 weekends for the sales season that began 20 Oct. and concluded 11 May. Lettuce was grown in a float system and plants were harvested and stored in a cooler with ice the night before sales. Heads of Boston and Red Boston were generally sold for $2.50 each and heads of romaine, Boston/romaine, and redleaf for $2.00 each. In 2007–08, an average of 194 total heads of all types were sold each week.

The beginning of hydroponic lettuce sales for green markets in Southeast Florida, 2001–09. The growers for Stephen's Produce were the first vendors to offer locally grown hydroponic lettuce for sale at green markets in Southeast Florida. Customers were already getting other greens from Stephen's Produce: bok choy (*Brassica rapa* spp. *chinensis* L.), spinach (*Spinacia oleracea* L.), Swiss chard (*Beta vulgaris* var. *flavescens* Lam.), turnip (*Brassica rapa* ssp. *rapa* L.), arugula (*Eruca sativa* Mill.), cilantro (*Coriandrum sativum* L.), parsley (*Petroselinum crispun* Mill.), green onions (*Allium cepa* L. var. *cepa*), garden cress (*Lepidium sativum* L.), mache (*Valerianella locusta* L.), mizuna (*Brassica rapa* spp. *japonica*), bekana (*Brassica rapa* ssp. *chinensis*), flat cabbage (*Brassica oleracea* var. *capitata* L.), basil (*Ocimum basilicum* L.), kale (*Brassica oleracea* var. *sabellica* L.), and collards (*Brassica oleracea* var. *viridis* L.) (Shuler et al., 2001, 2003a, 2003b, 2004a, 2004b, 2005a, 2005b, 2006a, 2006b, 2007, 2008a, and 2008b). Both head and leaf types of lettuce have been grown commercially in the Everglades Agricultural Area (EAA) of Palm Beach County, FL, for many years. For three seasons, 2001–04, local field grown lettuce was sold at the Greenmarket in West Palm Beach by Growers Management, a commercial lettuce grower located in the EAA. Another local operation (Swank Produce in Loxahatchee) is currently growing and selling hydroponic lettuce at the Greenmarket in West Palm Beach. The different varieties of lettuce that have been grown and sold by Stephen's Produce are listed in Table 1. A bibb variety was the choice for the "debut" selection because it was considered the "Cadillac" of lettuces, having a mild texture and flavor. Once a source of seed for 'Ermosa', a Boston variety, was found, it was selected as the butterhead type and replaced 'Buttercrunch'. 'Ermosa' had been the mildest of six cultivars grown in a similar float system in central Florida by Fedunak and Tyson (1997). Lettuce production was increased to approximately 100 heads per week for the 2004–05 season (Table 2) to help satisfy the market demand that had been generated by Growers Management since they would no longer be selling at the Greenmarket. 'Forest Green', a very dark green romaine cultivar, was first grown for sale in 2004–05 and has been continued to the present. For the 2005–06 season, production was increased to approximately 140 heads per week and was the first year that 'Winter Density', a romaine/Boston hybrid, was grown for sale. Production was increased to approximately 180 heads per week in 2006–07 and to approximately 220 heads per week in 2007–08. In 2007–08 two cultivar changes were made: 'Adriana', a larger-headed 'Ermosa' type, replaced 'Ermosa' as the primary Boston cultivar; and a red Boston variety, 'Fire-

*Corresponding author; email: skshuler@aol.com; phone: (561) 512-5222

Table 1. Lettuce varieties grown by Stephen's Produce for sale at greenmarkets in southeast Florida, 2001–09.[z]

Cultivar[z]	Type	Seasons grown	Expected days to maturity[y]	Comments
Buttercrunch	Bibb	2001–03	46	
Dark Red Lollo Rossa	Redleaf	2002–09	53	Chosen for very dark red coloration
Ermosa	Boston	2003–08	48	Chosen for mild flavor
Green Forest	Romaine	2004–09	56	Very dark green
Winter Density	Romaine/Boston hybrid	2005–09	54	Chosen for romaine/Boston characteristics
Jericho	Romaine	2007–08	57	Discontinued; did not grow well
Adriana	Boston	2007–09	48	A larger and improved Ermosa type
Fireball	Red Boston	2007–09	51	

[z]Johnny's Select Seeds was the source for all seeds.
[y]Based on information provided by Johnny's Select Seeds.

Table 2. Amount of lettuce planted per week by Stephen's Produce for sale at greenmarkets in southeast Florida, 2001–09.[z]

Seasons	No. weeks	Boston/bibb[y]	Redleaf	Romaine	Romaine/ Boston hybrid	Red Boston	Total no. of heads
2001–02	22/9	24	6				30
2002–03	22	28	21				49
2003–04	23	42	30				72
2004–05	28	42	48	18			114
2005–06	27	54	54	18	18		144
2006–07	28	72	60	24	24		180
2007–08	29	96	54	26	26	20	222
2008–09		96	64	28	28	28	244

[z]Average number of heads planted per week.
[y]Bibb for 2001–03; Boston for 2003–09.

ball', was introduced. For the 2008–09 season, production was increased to approximately 240 heads per week; however, sales did not subsequently increase. A vegetable vendor who had been selling at the Lake Worth Greenmarket moved to the greenmarket in West Palm Beach and may have been partially responsible for reduced sales of lettuce for Stephen's Produce.

Building and managing the "floating garden." Lettuce seedlings were grown in a passive "floating garden." Wooden frames were constructed to support a plastic polyethylene liner which was filled with water and nutrient solution. A grid of 36 holes was drilled into each of two pieces of rigid foam insulation measuring 4 ft × 4 ft. Rockwool cubes containing lettuce seedlings were transplanted into the holes in the sheets of foam insulation that were floated on top of the water in the 4 ft × 8 ft frames (Fig. 1). Details of float frame construction, setup, nutrient solution, and float management were presented in Shuler et al., 2009. For the 2008–09 season, a total of 29 wooden frames were used to grow 93 floats of lettuce and two floats of marigolds (14 frames were used four times; 11 frames, three times; two floats, two times; and two floats, one time).

Seedling establishment and transplanting. Seedlings were started in rockwool cubes which were inserted into holes cut into the sheets of foam insulation. Details of the seeding and transplanting operations were presented in Shuler et al., 2009. Thermodormancy, which inhibits seedling emergence, is common in some lettuce cultivars; and it was bypassed by keeping seeded rockwool cubes indoors under air conditioning until emergence occurred (usually within 2 d). Seeding was usually done at night and the rockwool cubes would then be taken outside on the second night. On the few occasions when the seedlings remained inside for more than 2 d, the stems would etiolate and the subsequent seedling growth was less than optimum.

Crop scheduling. Even though weather conditions were not optimum for growing lettuce in late August and September, planting was usually begun in late August so that some lettuce would be available for sale at the first market on the third weekend of October (Fig. 2). Thereafter plantings were made on about a weekly basis to accommodate the 27- to 28-week sales season with the last plantings made in late February. With the onset of cooler winter weather, seedling growth was delayed such that days from seeding to transplanting were increased from 8 d to 15 d and days to harvest increased from 47 d in October to 67 d for March

Fig. 1. Lettuce seedlings were grown in a passive "floating garden." Wooden frames were constructed to support a plastic polyethylene liner that was filled with water and nutrient solution. A grid of 36 holes was drilled into each of two pieces of rigid foam insulation measuring 4 ft × 4 ft. Rockwool cubes containing lettuce seedlings were transplanted into the holes in the sheets of foam insulation, which were floated on top of the water in the 4 ft × 8 ft frames.

Fig. 2. Lettuce planting was staggered so that some lettuce would be available for sale at the first market on the third weekend of October and continuously thereafter until the end of the season.

Table 3. Average days to transplanting and harvesting for 'Adriana' Boston lettuce, 2008–09.

Planting no.	Seeding date	Transplanting date	Days to transplanting	Harvest date	Days to harvest
1	31 Aug.	10 Sept.	10	17 Oct.	47
2	7 Sept.	16 Sept.	9	24 Oct.	47
3	12 Sept.	22 Sept.	10	31 Oct.	49
4	19 Sept.	29 Sept.	10	7 Nov.	49
5	26 Sept.	4 Oct.	8	14 Nov.	49
6	2 Oct.	12 Oct.	10	21 Nov.	50
7	7 Oct.	17 Oct.	10	28 Nov.	52
				5 Dec.	59
8	12 Oct.	27 Oct.	15	12 Dec.	61
9	19 Oct.	3 Nov.	15	19 Dec.	61
10	26 Oct.	11 Nov.	16	26 Dec.	61
11	2 Nov.	18 Nov.	16	2 Jan.	61
12	7 Nov.	25 Nov.	18	9 Jan.	63
13	14 Nov.	25 Nov.	11	16 Jan.	63
14	19 Nov.	3 Dec.	14	23 Jan.	65
15	26 Nov.	10 Dec.	14	30 Jan.	65
16	3 Dec.	17 Dec.	14	6 Feb.	65
17	10 Dec.	24 Dec.	14	13 Feb.	65
18	15 Dec.	31 Dec.	16	20 Feb.	67
19	22 Dec.	7 Jan.	16	27 Feb.	67
20	29 Dec.	14 Jan.	16	7 Mar.	67
21	5 Jan.	21 Jan.	16	13 Mar.	67
22	12 Jan.	28 Jan.	16	20 Mar.	67
23	19 Jan.	5 Feb.	17	27 Mar.	67
24	27 Jan.	13 Feb.	17	3 Apr.	66
25	5 Feb.	19 Feb.	14	10 Apr.	64
26	11 Feb.	26 Feb.	15	17 Apr.	65
27	18 Feb.	5 Mar.	15	17 Apr.	58
28	25 Feb.	12 Mar.	15	25 Apr.	58

harvests (Table 3). A double planting was usually made on one seeding date in early November to allow for the delay in maturity for winter lettuce. One of the constraints for increasing production of open ground crops grown by Stephens's Produce has been the limited availability of garden space (0.4 acres). Once the backyard garden was fully planted (usually by early November), the only space available for planting was where crops had been recently harvested. To greatly increase the space for one crop would mean reducing the space for another crop. Hydroponic lettuce was a separate operation and has not yet taken up all of the available space. Although all of the existing float frames were used each year, more float frames could be constructed whenever needed. Under the current production schedule each float produced an average of three crops during the 28-week season.

Growing the crop and pest management. Growing lettuce in the float system had several cultural benefits: the lettuce heads were usually very clean (no contact with soil) and there were usually no weeds. Wind blown soil was usually never a problem on the lettuce leaves. Pine needles and pine pollen were often present in season. The pine needles would be removed and the presence of pollen would be explained to customers if they asked. Since the older, more porous sheets of foam insulation usually became waterlogged, weed seeds would germinate on the top surface and their roots would penetrate the insulation and grow into the nutrient solution below. These weeds were usually tolerated for that crop but were pulled out before the next use of the insulation. Algae would also grow on top of the older sheets of foam insulation. The algae and the moist, waterlogged surface may have contributed to the decay of the crop's older, lower leaves which would be in contact with the top surface of the insulation. Decay of bottom leaves also seemed to be increased whenever there was frequent, prolonged rainfall which also tended to keep the top surface of the insulation moist.

Sometimes young seedlings were damaged before or after transplanting by etiolation or by hard, driving rains, resulting in fewer potential heads for sale. If a decrease in plant stand was detected early enough, there was the option of increasing the number of plants seeded in the next sowing. This would allow for a rather constant number of heads for weekly harvest via harvesting some of the "younger" and smaller heads from the "next sowing." There were times when extra seedlings were not grown to replace those lost by poor plant stand; this would result in decreased supply for the affected week. Foliar diseases have usually not been a problem but were sometimes present and seemed to be on the increase in recent years.

There were also times when lettuce growth after transplanting was stunted or leaves were discolored or malformed. The causes for all of these growth problems were not determined. Plants with discolored or mildly chlorotic leaves were often still harvested and sold. However, plants with more severely affected leaves were usually discarded. Slower than expected growth resulting in heads that were smaller or delayed in formation was usually associated with a stunted root system. Under warm and/or dry weather conditions, it was not unusual for the more mature heads

of lettuce to be slightly wilted by early afternoon. Such wilting due to excessive transpiration was even more pronounced where root systems were stunted. Since bolting was more common for lettuce grown in October and April, plants would often be harvested at an earlier stage during this period. Sometimes plants which had just started to bolt would still be offered for sale. A few frost and freeze events have occurred over the years that lettuce has been grown. Even though leaves would be covered with frost and be stiff from frost and freeze, most plants recovered sufficiently and retained market quality so that they could be sold.

Crop protective chemicals were used as described in previous reports of garden crops grown by Stephen's Produce (Shuler et al., 2003a, b, 2004a, b, 2005a, b, 2005a, b). Worms, aphids, and leaf miners could have been a problem for lettuce, especially in the winter and spring. The crop protective chemical program used for insects usually provided excellent control of worms and leafminers; however, in the spring, it was not unusual to find masses of worm eggs on crop leaves. Crop protective chemicals were used on demand for aphids. Scouting for pests was done at harvest. When pests were detected at harvest, younger plantings would be further examined and sprayed if needed.

Infections of bacterial leaf spot were infrequent and bactericides were never used. Mildew infections have been on the increase in recent years, but were still considered a minor problem and fungicides were usually not used. Tip burn on leaf edges also occurred intermittently. Affected portions of the leaves were either broken off at harvest or when damage was more severe, plants were left unharvested.

Harvesting. On Friday, lettuce was usually the last crop harvested and harvesting was usually done after sundown and often completed after midnight. On Saturday, all crops were usually harvested after sundown and lettuce was often harvested early Sunday morning just before leaving for the greenmarket. Lettuce heads were pulled out of the floats by either grasping both sides of the heads from the top and pulling up lightly or by reaching underneath the head and prying it loose. Whenever heads resisted pulling, the float would be lifted up from the side and the plant pushed out by its roots and lower stem. There were usually a few small, older leaves that were either senescent or decayed and these would be pulled off. The root mass would usually be pinched off at the base of the rockwool cube, but the cube would be left intact. Excess water would be squeezed out of the cube. Sometimes the stems would break off at the top of the foam insulation leaving the lower stem and root mass intact in the float. Lettuce heads were usually left unwashed. For the first two seasons when production was relatively low, individual heads were put into gallon-sized plastic storage bags that were left unsealed. The bags were then loosely stacked inside a cooler with ice for transport to the market. Since 2003–04, lettuce heads have not been bagged, but have been loosely stacked naked on top of each other inside the coolers (usually root end down or to the side). If there were marked differences in head size for a given harvest, the smaller heads would be harvested first and put in the bottom of the cooler so that the larger heads on top would be available for sale first. Two full coolers of lettuce containing all five types would usually be opened for display at the market in West Palm Beach. Additional heads of Boston lettuce would be stored in a third cooler which was not displayed. Lettuce was not put out for display on top of the cooler lids as was other crops. Instead, the name and price sign was taped to the side of the cooler and the lettuce was sold directly out of the cooler. Sometimes lettuce in the two display coolers would start to wilt near the end of the market day. Any lettuce 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. The primary greenmarket outlets have been the Saturday market in West Palm Beach, FL (7 AM to 1 PM for 27 weeks, late October to late April), where Stephen's Produce has 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 Stephen's Produce has 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 lettuce has been relatively steady over the past 8 years. Since 2001 when Stephen's Produce first offered locally grown hydroponic lettuce for sale, production has been increased each year in an attempt to increase our market share of greenmarket lettuce sales. Our competition for sales has been other local growers of both hydroponic and field grown lettuce and purveyors who also offer lettuce for sale. Several "regular" customers were already buying other leafy vegetables from Stephen's Produce before lettuce was grown for sale. Because these customers were satisfied with the items that they had already been purchasing, they were readily interested in trying the "new crop" offering of fresh hydroponic lettuce. With the present levels of production, there were usually enough heads of lettuce to satisfy the demand from most of our customers. Several of our most regular lettuce customers would come early and would come most every weekend to the market. Free leaf samples for tasting were provided if requested for new customers.

Week to week, the size and quality of lettuce was more uniform than for most other crops grown by Stephen's Produce. Lettuce was sold by the head and prices were usually held constant throughout the marketing season. In 2001–02, prices were set at $1.00/head. Prices have been increased to the current values of $2.50 for Boston and red Boston and $2.00 for romaine, romaine/Boston hybrid, and redleaf. Whenever quality was reduced or heads were smaller than normal, prices would usually be lowered by $0.50. A certain number of heads would be reserved each week for harvest for the Stuart market on Sundays. Whenever lettuce was not sold out at the West Palm Beach market, the leftover heads would also be taken to Stuart along with the heads which had been previously designated for sale at Stuart. The best quality heads would be sold first to the early shoppers and the leftover heads would usually be sold at a discount afterwards. Sometimes the leftover heads remained unsold and were brought back home to be given away to neighbors or taken to a local high school and given to teachers and school staff.

Production and sales figures. Detailed production and sales figures were provided for the 2007–08 season (Table 4). This was one of the most productive season and was not affected by hurricanes as were the 2004–06 seasons. The greatest amount of lettuce sold was on the weekend of 22 Dec. 2007 when 245 heads were sold for a total value of $525 (Boston, 128 heads; redleaf, 57 heads; romaine, 22 heads; romaine/Boston, 15 heads; and red Boston, 23 heads). A summary of seasonal lettuce production and sales is provided in Tables 5–10.

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. For some of our customers, lettuce was their main purchase. For others, lettuce

Table 4. Boston lettuce sales for Stephen's Produce at green markets in Southeast Florida, 2007–08.

Market weekend	Heads of Boston lettuce				
	No. taken	No. sold	$ sales	$ per head	No. unsold
19 Oct.	22	22	$55	$2.50	
26 Oct.	84	84	$198	$2.36	
2 Nov.	60	58	$102	$1.76	2
9 Nov.	77	67	$152	$2.27	10
16 Nov.	103	98	$223	$2.28	5
23 Nov.	64	64	$148	$2.31	
30 Nov.	82	77	$188	$2.44	5
7 Dec.	86	74	$170	$2.30	12
14 Dec.	69	68	$156	$2.29	1
21 Dec.	128	128	$295	$2.30	
28 Dec.	95	90	$215	$2.39	5
4 Jan.	84	78	$186	$2.38	6
11 Jan.	118	115	$279	$2.43	3
18 Jan.	97	97	$228	$2.35	
25 Jan.	104	95	$223	$2.35	9
1 Feb.	94	90	$208	$2.31	4
8 Feb.	65	65	$159	$2.45	
15 Feb.	98	94	$222	$2.36	4
22 Feb.	112	98	$224	$2.29	14
29 Feb.	100	100	$228	$2.28	
7 Mar.	80	76	$172	$2.26	4
14 Mar.	115	115	$253	$2.20	
21 Mar.	85	82	$203	$2.48	3
28 Mar.	81	62	$138	$2.23	19
4 Apr.	77	70	$154	$2.20	7
11 Apr.	100	99	$223	$2.25	1
18 Apr.	92	64	$144	$2.25	28
25 Apr.	61	54	$122	$2.26	7
2 May	81	71	$147	$2.07	10
9 May	89	68	$138	$2.03	21
Total	2603	2423	$5550	$2.29	180
Avg per wk	87	81	$185		6

Table 5. Summary of Boston lettuce sales for Stephen's Produce at green markets in Southeast Florida over a 7-year period, 2001–08.

Season	Location	Harvest and sales season	No. of weeks sold	No. heads taken	No. heads sold	No. sold per wk	Avg price per head	Total sales value	Sales value per wk	No. heads unsold	Unsold (% of total taken)
2001–02	WPB[z]	10 Nov.–27 Apr.	25	561	517	21	$1.00	$517	21	44	7.8%
2002–03	WPB, PBG[y], Stuart	23 Nov.–11 May	24	607	567	24	$0.97	$552	$23	40	6.6%
2003–04	WPB, Wellington, Stuart	19 Oct.–22 May	30	973	936	31	$1.20	$1123	$37	37	3.8%
2004–05	WPB, Stuart	6 Nov.–30 Apr.	26	1078	1048	40	$1.43	$1497	$58	30	2.3%
2005–06	WPB, Stuart	5 Nov.–9 May	27	1323	1294	48	$1.92	$2485	$92	29	2.2%
2006–07	WPB, Stuart	21 Oct.–29 Apr.	27	1952	1883	70	$1.95	$3673	$136	69	3.5%
2007–08	WPB, Stuart	20 Oct.–10 May	30	2603	2423	81	$2.29	$5550	$185	180	6.9%

[z]West Palm Beach, FL.
[y]Palm Beach Gardens, FL.

was one of several items purchased. Many customers would buy either multiple heads of the same variety or single heads of several different varieties. For customers who bought the 'Forest Green' romaine and the 'Winter Density' romaine/Boston hybrid, it was usually their first experience with these cultivars. For several customers, Stephen's produce was the preferred source of lettuce for their weekly supply.

Customers would often comment on the freshness of the lettuce grown by Stephen's Produce and that it could remain fresh after prolonged storage in the refrigerator, even up to 2 weeks or

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

Season	Location	Harvest and sales season	No. of weeks sold	No. heads taken	No. heads sold	No. sold per wk	Avg price per head	Total sales value	Sales value per wk	No. heads unsold	Unsold (% of total taken)
2002–03	WPB[z], PBG[y], Stuart	23 Nov.–11 May	24	462	446	19	$1.00	$444	$18.50	16	3.5%
2003–04	WPB, Wellington, Stuart	19 Oct.–25 Apr.	23	479	477	21	$1.18	$563	$24.78	2	0.4%
2004–05	WPB, Stuart	6 Nov.–15 May	28	1164	1140	41	$1.47	$1676	$59.86	24	2.1%
2005–06	WPB, Stuart	5 Nov.–9 May	27	1151	1132	42	$1.68	$1903	$70.48	19	1.7%
2006–07	WPB, Stuart	21 Oct.–29 Apr.	27	1478	1391	52	$1.86	$2587	$95.81	87	5.9%
2007–08	WPB, Stuart	20 Oct.–10 May	30	1605	1561	52	$1.80	$2815	$93.83	44	2.7%

[z]West Palm Beach, FL.
[y]Palm Beach Gardens, FL.

Table 7. Summary of romaine lettuce sales for Stephen's Produce at green markets in Southeast Florida over a 4-year period, 2004–08.

Season	Location	Harvest and sales season	No. of weeks sold	No. heads taken	No. heads sold	No. sold per wk	Avg price per head	Total sales value	Sales value per wk	No. heads unsold	Unsold (% of total taken)
2004–05	WPB[z], Stuart	6 Nov.–30 Apr.	26	469	461	18	$1.62	$748	$28.77	8	1.7%
2005–06	WPB, Stuart	5 Nov.°25 Apr.	24	432	428	18	$1.69	$725	$30.21	4	0.9%
2006–07	WPB, Stuart	21 Oct.°29 Apr	27	549	512	19	$1.97	$1009	$37.37	37	6.7%
2007–08	WPB, Stuart	20 Oct.°10 May	29	723	714	24	$1.85	$1319	$45.48	9	1.2%

[z]West Palm Beach, FL.

Table 8. Summary of romaine/Boston hybrid lettuce sales for Stephen's Produce at green markets in Southeast Florida over a 3-year period, 2005–08.

Season	Location	Harvest and sales season	No. of weeks sold	No. heads taken	No. heads sold	No. sold per wk	Avg price per head	Total sales value	Sales value per wk	No. heads unsold	Unsold (% of total taken)
2005–06	WPB[z], Stuart	5 Nov.–2 May	24	381	370	15	$1.70	$630	$26.25	11	2.9%
2006–07	WPB, Stuart	21 Oct.–29 Apr	26	585	548	21	$1.92	$1054	$40.54	37	6.3%
2007–08	WPB, Stuart	20 Oct.–10 May	29	688	677	23	$1.81	$1223	$42.17	11	1.6%

[z]West Palm Beach, FL.

Table 9. Summary of red Boston lettuce sales for Stephen's Produce at green markets in Southeast Florida for 2007–08.

Season	Location	Harvest and sales season	No. of weeks sold	No. heads taken	No. heads sold	No. sold per wk	Avg price per head	Total sales value	Sales value per wk	No. heads unsold	Unsold (% of total taken)
2007–08	WPB[z], Stuart	20 Oct.–10 May	30	479	477	16	$2.14	$1022	$34.06	2	0.4%

[z]West Palm Beach, FL.

Table 10. Summary of lettuce production by Stephen's Produce for sale at green markets in Southeast Florida over a 7-year period, 2001–08.

Season	Harvest and sales season	No. weeks planted	Estimated no. floats planted	Avg days to harvest	Estimated no. plants seeded	% Of seeded that were harvested	No. heads harvested	No. heads sold	$ Value sold	$ Per head	$ Per float
2001–02	10 Nov.–27 Apr.	25	11	68	792	71%	561	517	$517	$1.00	$47
2002–03	23 Nov.–11 May	24	17	68	1224	87%	1069	1013	$996	$0.98	$60
2003–04	19 Oct.–22 May	23	23	54	1656	88%	1452	1413	$1686	$1.19	$73
2004–05	6 Nov.–30 Apr.	26	35	55	2520	89%	2242	2188	$3173	$1.45	$91
2005–06	5 Nov.–9 May	27	54	57	3888	85%	3287	3224	$5743	$1.78	$106
2006–07	21 Oct.–29 Apr	27	70	57	5040	91%	4564	4334	$8323	$1.92	$119
2007–08	20 Oct.–10 May	30	87	60	6264	97%	6098	5852	$11,929	$2.04	$137

longer. Most regular customers of lettuce would purchase some each time they shopped at the market.

Literature Cited

Fedunak, Charles A. and Richard V. Tyson. 1997. Lettuce cultivars for low-tech non-circulating hydroponics. Proc. Fla. State Hort. Soc. 110:384–385.

Shuler, K.D., S.J. Nie, and P-A.N. Shuler. 2001. The evolution of production, harvesting, and marketing techniques for bok choy Chinese cabbage from Stephen's Produce "garden fresh" vegetables at local green markets in Palm Beach County, Florida. Proc. Fla. State Hort. Soc. 114:224–231.

Shuler, K.D., S.J. Nie, and P-A.N. Shuler. 2003a. Growing and marketing spinach at local green markets in south Florida. Proc. Fla. State Hort. Soc. 116:325–331.

Shuler, K.D., S.J. Nie, and P-A.N. Shuler. 2003b. Growing and marketing Swiss chard at local green markets in south Florida. Proc. Fla. State Hort. Soc. 116:331–336.

Shuler, K.D., S.J. Nie, and P-A.N. Shuler. 2004a. Growing and marketing Chinese radishes and turnips at local green markets in southeast Florida. Proc. Fla. State Hort. Soc. 117:256–267.

Shuler, K.D., S.J. Nie, and P-A.N. Shuler. 2004b. Growing and marketing arugula at local green markets in southeast Florida. Proc. Fla. State Hort. Soc. 117:267–274.

Shuler, K.D., S.J. Nie, D.V. Shuler, and P-A.N. Shuler. 2005a. Growing and marketing cilantro and Italian parsley at local green markets in southeast Florida. Proc. Fla. State Hort. Soc. 118:330–341.

Shuler, K.D., S.J. Nie, D.V. Shuler, and P-A.N. Shuler. 2005b. Growing and marketing green onions at local green markets in southeast Florida. Proc. Fla. State Hort. Soc. 118:353–360.

Shuler, K.D., S.J. Nie, D.V. Shuler, and P-A.N. Shuler. 2006a. Growing and marketing garden cress and mache at local green markets in southeast Florida. Proc. Fla. State Hort. Soc. 119:291–296.

Shuler, K.D., S.J. Nie, D.V. Shuler, and P-A.N. Shuler. 2006b. Growing and marketing mizuna and bekana at local green markets in southeast Florida. Proc. Fla. State Hort. Soc. 119:297–302.

Shuler, K.D., P-A.N. Shuler, S.J. Nie, and D.V. Shuler. 2007. Growing and marketing cabbage at local green markets in southeast Florida. Proc. Fla. State Hort. Soc. 120:151–154.

Shuler, K.D., P-A.N. Shuler, S.J. Nie, and D.V. Shuler. 2008a. Growing and marketing basil at local green markets in southeast Florida. Proc. Fla. State Hort. Soc. 121:204–207.

Shuler, K.D., P-A.N. Shuler, S.J. Nie, and D.V. Shuler. 2008b. Growing and marketing collards and kale at local green markets in southeast Florida. Proc. Fla. State Hort. Soc. 121:214–218.

Shuler, K.D., S.J. Nie, D.V. Shuler, and P-A.N. Shuler. 2009. Using a float system to grow hydroponic lettuce for sale at local green markets in southeast Florida. Proc. Fla. State Hort. Soc. 122:194–196.