active community sites with over 700 garden plots around Jacksonville. Currently, there are 20 community gardens with 198 individual plots within the project. Some of the gardens have remained active since their establishment, while others have given way to construction and other demises.

School gardens

Urban Gardening staff have worked diligently with Duval school officials and teachers to bring the gardening experience to school children. An average of 31 gardens per year were started or maintained as a result of assistance by project staff. Each garden involved many students and classes. Students who did not have a school garden were often transported to demonstration and/or community garden sites for various educational activities.

Current Participation and Benefits

In 1996, with a limited staff and the help of volunteer Master Gardeners, 3600 citizens received educational assistance on vegetable gardening. There were 20 community gardens, with 198 plots, on a combined area of 313,200 sq. ft. (7.19 acres). Based on a USDA formula of $0.60 per sq. ft., the estimated value of produce grown was $186,000. In addition there were 20 school gardens on 250,000 sq. ft. (5.75 acres), containing $75,000 worth of vegetables. Also assisted were 257 home gardeners, with an area of 525,000 sq. ft. (12 acres), and a production value of $315,000. The overall value of produce grown by participants in 1996 was about $576,000.

Has the program paid off?

Over a 19-year period, the Jacksonville "Gardening Lots" project has "cost" taxpayers $2,594,000. in appropriated funds. The money has provided needy citizens with an opportunity to share in a bounty of $14,913,500 worth of fresh garden vegetables, grown on 6000 individual plots in 550 community gardens, 600 school gardens, and 7000 home gardens. That calculates to a positive 5:1 return on the government's investment. But beyond the tangible benefits derived from growing, serving, preserving, and otherwise enjoying fresh, nutritious vegetables are the intangibles—the societal impacts such as reduced crime, increased neighborhood pride, heightened self-esteem and personal gratification. These city dwellers turned urban gardeners have reached out for a taste of the good life in their struggle for survival, and for at least some of them, for a short while, have found it!

Literature Cited

Buckalew, Evelyn. 1985. Green for mean streets. Penn State Agriculture. Fall, 1985. pgs. 2-8.

Richmond, Fred. 1981. Urban Gardening Workshop. Washington, D.C. Personal communications.

Stampfli, S. R. and Dave Davis. 1996. The 1996 Davis Productivity Awards. Eighth Edition, p. 68.

Stephens, J. M., M. L. Kelt, and N. Seely. 1980. The Jacksonville Urban Gardening program. Proc. Fla. State Hort. Soc. 93:67-69.

Stephens, J. M. and K. M. Delate. 1984. Florida Master Gardener program: first five years. Proc. Fla. State Hort. Soc. 97:253-256.

Proc. Fla. State Hort. Soc. 109:296-298. 1996.

ORGANIC SOIL AMENDMENT STUDIES WITH TOMATO

J. M. STEPHENS AND S. R. KOSTEWICZ
Horticultural Sciences Dept.
University of Florida, IFAS
Gainesville, FL 32611

Additional index words. Vegetable gardening, organic fertilizers.

Abstract. **Since the spring of 1990, an on-going study has been conducted at the University of Florida's Organic Gardening Research and Education Park, Gainesville, on the effects of various organic soil amendments on selected vegetables. One dozen 5 × 10 ft "grow-boxes" were amended annually with each box receiving a different organic material. The purpose was to determine and demonstrate optimum amounts of these amendments as a source of fertility for growing garden vegetables. Results and data in previous years have been reported. The spring, 1995 study with tomatoes constitutes the subject of this paper. Most of the organic soil amendments and fertilizers applied in previous years were broadcast in the boxes again, although some treatments were discontinued and replaced with others. The following amendments were broadcast at both a low and a high rate two weeks prior to setting two 'Better Boy' tomato transplants per treatment, March 15, 1995:oak leaves; yard waste compost (YWC); YWC plus organic fertilizer (Fertrell 3-2-3); organic fertilizer (Fertrell 3-2-3); chicken manure; composted chicken manure (RR 3-5-3); and combined amendments (sheep manure + RR + YWC).Tomatoes were harvested six times, with results reported as number and weight of fruit-yield per plant. Top yields came from the mixed amendments box, followed closely by the chicken litter box and the box containing the high rate of YWC + Fertrell 3-2-3. Other amendments gave fair to poor results.**

It is wise to utilize organic wastes in vegetable gardens for at least two very good reasons: first, they provide valuable benefits as soil amendments and fertilizers, and second, these waste products present quite a disposal problem for society. About 20 million tons of solid waste were produced in Florida in 1992, constituted in part by 3 million tons of yard waste and ½ million tons of animal manures (Smith, 1994). Since this organic waste matter is not allowed in landfills, an obvious viable option is to incorporate it into good agricultural practices. Amending garden soils appears to be one excellent way to recycle these waste products effectively. Previous trials at the Organic Gardening Research and Education Park have strongly indicated that 20 to 40 tons/A of yard waste compost, supplemented with organic fertilizer or animal manure and

incorporated annually, resulted in very satisfactory production of several garden vegetables (Stephens and Kostewicz, 1992). Even higher yields were obtained when these materials were applied at much greater rates. In a spring 1994 test, highest yields of cucumbers were recorded for a plot receiving 520 tons/acre of multiple organic amendments over a 5-year period, or about 100 tons annually (Stephens and Kostewicz, 1994). Since as much as 1.6 million tons of in-state yard waste compost are available annually (Smith, 1994), with an estimated 10,000 acres of vegetable gardens in Florida (Gallup, 1986), at least half of this composted yard waste could be utilized in vegetable gardens, not to mention all the other types of gardens. Likewise, the application of livestock manure has been a standard agricultural practice for decades, and remains a viable soil improvement option for home gardeners. Part of the beneficial effects accruing from the use of organic amendments on Florida's coarse sands is increased fertility, while other improvements are also important. With fast diminishing water supplies, researchers are investigating various water-conserving techniques, such as irrigation scheduling (Locascio and Smajstrla, 1996). Water applied at any time and in various quantities is held longer by the organic fraction in soils amended with organics, for more efficient plant use.

The purpose of this current study is to observe the effects of additional applications of organic amendments to plots previously amended at relatively high rates, and to look closely at certain other amendments which were not in the earlier trials.

Materials and Methods

'Better Boy' tomatoes were used as the test crop. Plots consisted of 8 "grow-boxes", each measuring 5' × 10' (50 sq ft), and constructed of 6-inch wide cedar boards. The boxes were established in the spring of 1990, and the sandy soil of each had been amended annually prior to this current test. Each box was divided in half by a center board. The eastern ½ (25 sq ft) received amendment at the low rate, while the western half received the higher amount (double the low rate).

Table 1 shows the cumulative amounts of amendments applied in 1995 and during the five years prior to this study. The amendments that were applied in spring 1995 for this study are outlined in Table 2.

Treatments: Organic Soil Amendments

The following organic materials were broadcast and incorporated into respective grow-boxes on March 1,1995, two weeks prior to planting the tomatoes.

Box A. Chicken litter—Fresh chicken litter was obtained from the UF Poultry Department. The low rate of 10 T/A (.5 lb/sq ft) was applied to the east side, while the high rate of 20 T/A (1 lb/sq ft) was incorporated on the west side of the grow-box.

Box B. Poultry compost (Red Rooster 3-5-3 tm)—This clean, granulated composted poultry manure (available at retail) was applied at the following two rates: low (2 T/A, or 0.1 lb/sq ft), and high (4 T/A, or 0.2 lb/sq ft).

Box C. Blended organic fertilizer (Fertrell 3-2-3 tm)—This is a product containing a blend of such ingredients as granite dust, castor pomace, bonemeal, cocoa shells, cottonseed meal, oyster meal, phosphate rock, green sand, and chicken manure. In Box C, the 3-2-3 fertilizer was applied at 2 T/A (0.1 lb/sq ft) and at 4 T/A (0.2 lb/sq ft).

Box D. Yard waste compost (YWC)—This compost was obtained from the Jacksonville facility, and applied in the box which had been amended previously with Gainesville YWC. The two rates applied in the spring of 1995 were 10 and 20 tons per acre, (or .5 and 1.0 lb/sq ft).

Box E. YWC plus Fertrell 3-2-3 tm—The Jacksonville YWC was applied at two rates. At the low rate (10 T/A), the compost was supplemented with a low rate of fertilizer (2 T/A). At the higher rate (20 T/A), the YWC received a higher rate of fertilizer supplement (4 T/A). Previously, this box had been amended with Gainesville YWC (see Table 1).

Box F. Mixture: Sheep manure + YWC + Red Rooster 3-5-3 TM—Previously, this box was amended heavily with a combination of these and other materials. This year the "low" side was amended as follows: Sheep manure (10 T/A), Jacksonville YWC (10 T/A), and Red Rooster 3-5-3 tm (2 T/A). The high side was amended as follows: Sheep manure (20 T/A), plus Jacksonville YWC (20 T/A), and Red Rooster 3-5-3 TM (4 T/A).

Box G. Oak leaves—1995 was the sixth year since 1990 that this "grow-box" had been amended with oak leaves. The "low rate"-side annually received an application of unshredded leaves in the amount of 20 T/A (1 lb/sq ft), while the "high rate"-side received 40 T/A (2 lb/sq ft). In 1995, the leaves were well aged, so that shredding was impractical.

Table 1. Cumulative amounts of organic soil amendments applied to "grow-boxes" during the first six years, 1990-1995*.

Treatment		Amount (lb/sq ft)	
Grow-box	Amendment	(low)	(high)
A	Chicken litter	3.20	7.30
B	Poultry compost	1.25	3.70
C	Organic 3-2-3 fertilizer	0.70	1.30
D	Yard waste compost	8.10	13.20
E	YWC + organic 3-2-3	6.10 + 0.85	11.20 + 1.15
F	Mixture	26.40	26.60
G	Oak leaves	5.50	11.00

*Applications made annually for six years.

Table 2. Effects of organic soil amendments on yield of 'Better Boy' tomatoes. Spring 1995.*

Treatment		Fruit Yield Per Plant**	
Organics	(lb/sq ft)	(number)	(lb)
Sheep + YWC + RR 3-5-3 tm	1.0+1.0+0.2	30	9.30
Chicken litter	1.0	22	8.85
Sheep + YWC + RR 3-5-3 tm	0.5+0.5+0.1	26	8.68
Chicken litter	0.5	31	8.55
YWC + Fertrell 3-2-3 tm	1.0+0.2	21	6.78
Fertrell 3-2-3 tm	0.2	24	6.61
YWC + Fertrell 3-2-3 tm	0.5+0.1	20	5.59
Oak leaves	1.0	17	4.41
Red Rooster 3-5-3 tm	0.2	13	4.05
Yard waste compost	1.0	13	4.01
Yard waste compost	0.5	16	3.70
Fertrell 3-2-3 tm	0.1	18	2.91
Oak leaves	0.5	11	2.16
Red Rooster 3-5-3 tm	0.1	8	1.67

*Data not statistically valid.
**Total of 6 pickings.

Plant establishment

On March 15, 1995, 'Better Boy' tomato plants (4-week old) were planted into the boxes. Two plants spaced 18" apart were set on each side, along with two 'Roma' plants. Data from the results of the 'Roma' tomato test are not presented in this paper, although they paralleled the 'Better Boy' data quite closely. All 'Better Boy' plants were staked, weeded, watered, and sprayed as needed with Bt and insecticidal soap for pest control.

Results and Discussion

Tomato fruits were harvested over a two month period, beginning May 26 and ending June 28. Fruits were picked as mature greens or ripes. Data for yield of fruit (number and weight) are presented in Table 2. Data were not analyzed statistically, and are for observational value only.

Fruit weight—The highest yields of tomato fruit (weight) were obtained from plants grown on soils amended with liberal amounts organic matter that contained adequate nutrients as well. The data in Table 2 show that excellent yields, ranging from 8.55 to 9.30 lb/plant, were produced with chicken litter and a mixture of amendments, respectively. Good yields of 5.59 to 6.78 lbs per plants were obtained from boxes containing the following amendments: the high rate of Fertrell, and both rates of YWC plus Fertrell.

Most boxes which were amended with a single material at relatively low rates (0.2 lb ft^3 or less), or with a single amendment high in carbon but low in nitrogen, produced only fair to poor yields (less than 5 lbs per plant). Box C with the higher rate of Fertrell was the exception, as it was the previous year with cucumbers (Stephens and Kostewicz, 1994).

Not only are these results consistent with earlier trials in these grow-boxes, they confirm several well- known principles of soil science. One such agreement is that large amounts of carbonaceous materials applied close to planting-time generally suppress growth and yields due to substantial nitrogen tie-up or depletion. However, when fortified with nitrogen, either as an integral part of the amendment such as is the case with chicken manure (2-3% N), or as a separate supplement, usually the amendment greatly enhances plant response. It is interesting to note that the box amended with large amounts of aged oak leaves produced a fair amount of tomatoes (4.41 lbs/ plant)- actually a little more than some other materials, including YWC (4.01).

Fruit numbers—When tomato yield is expressed as number of fruits produced per plant, the results follow closely that for weight yields. All of the treatments that resulted in good to excellent yields when measured by weight produced from 20 to 30 fruits per plant, which is reasonably good.

Summary—While these data are not statistically valid, they do continue to point to the utilization of substantially large amounts of organic waste products as a feasible way to amend soils for growing vegetables in Florida. Again, as was true in past years of these grow-box studies, the concept of "more is better" prevailed in this year's test. The highest yields of tomatoes were obtained in the box where multiple organics were applied two weeks before planting, and for several seasons previously. That particular box now contains the remnants of 540 tons per acre of various organic soil amendments, and plans are to continue to increase that amount and to study the effects on garden vegetables.

Literature Cited

1. Gallup Organization. 1986. National gardening survey: 1985-1986. National Gardening Association, Burlington, Vt.
2. Locascio, S. J. and A. G. Smajstrla. 1996. Water application scheduling by pan evaporation for drip-irrigated tomato. J. Amer. Soc. Hort. Sci. 121(1):63-68.
3. Smith, Wayne H. 1994. Recycling composted organic materials in Florida. University of Florida, Instit. Food Agri. Sci. BP-2. Gainesville, FL.
4. Stephens, James M. and S. R. Kostewicz. 1992. Organic soil amendments for Florida gardens. Proc. Fla. State Hort. Soc. 105:263-265.
5. Stephens, James M. and S. R. Kostewicz. 1994. Response of cucumber to organic soil amendments. Proc. Fla. State Hort. Soc. 107:382-384.