Franklin County Master Gardener Volunteers Vegetable Trials Annual Report 2014

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Introduction

The Vegetable Trials are a research activity of the Franklin County Extension Service Master Gardener Volunteer Program. The aim of the project is to evaluate vegetables that extend the diversity of backyard and local foods usually grown in Central Ohio, using good cultural practices that are within the reach of the home gardener. The project gives Master Gardeners the added benefits of learning and developing their own skills and knowledge by working with other Master Gardeners. Most of the produce is contributed to food pantries in the Central Ohio community. This report documents the results of the 2014 growing season.

Method

The plot used in the 2014 Vegetable Trials is a part of the Waterman Farm, a part of the OSU Agricultural Research and Development Center, located at the northwest corner of Kenny Road and Lane Avenue in Columbus, Ohio. The plot is 97' by 87' in size. It consists of a raised bed that is 4' by 50' divided into 12 subplots, four square foot gardens in a 9' by 9' plot, a "three sisters" garden and 11 cultivated rows 4' in width and divided by 3' paths. The vegetables grown in the raised bed subplots in 2014 included: beets, carrots, celery, chard, kale, leeks, lettuce, onions and spinach. The other vegetables included in the report that follows were planted in the rows that constitute the largest part of the plot. Ten of the rows were divided into three 20' segments and the final row was divided into two 20'segments. Each vegetable variety occupied one of the three row segments, each of which was approximately 20' in length. Two exceptions existed: (1) the squash varieties occupied two sections on adjacent rows and (2) the final row was fashioned into a hill for the sweet potatoes. While we did not count most of the number of plants in each section of the plot, similar spacing within a given common group (e.g., beets, squash) should enable us to make a rough comparison of the productivity of varieties of the same type of vegetable. Planting did begin with 10 of each variety of tomato, 12 of each pepper, and 12 of both eggplants. The square foot gardens and the "three sisters" garden included a number of vegetables and herbs that were not included in the data gathered from the raised bed and the major section of the plot. Some of the row sections were devoted to "plant a row" crops and were not included in the evaluative data described in this report.

Vegetable varieties are chosen by subcommittees of Master Gardeners during the winter season and acquired from a variety of seed sources. Vegetables in the raised beds, square foot and "three sisters" gardens were begun directly in the plot. Leeks and onions were planted as bulbs, white potatoes as seed potatoes, and sweet potatoes as slips. Most of the other varieties (cucumbers, eggplant, peppers, squash, and tomatoes) were sown as seeds in FAF Surefire Germination Mix and begun in the OSU greenhouses before being transplanted into the plot. The remainder was planted directly in the plot.

Various methods were used to encourage growth and aid maintenance. The plot is usually tilled after the previous season has been completed. Early in the spring, well in advance of planting, composted manure and some fast-dissipating herbicides were tilled into the plot to prepare it and to minimize later weeding. Worm compost alone is applied as a top layer in the raised bed. For a few weeks after transplanting, row covers were used to encourage the eggplant, squash and cucumbers. Once planted,

the paths between the rows were covered with mulch. Drip lines were placed in the center of each of the rows in the main plot with two drip lines placed in the sweet potato area. The raised bed, square foot and "three sisters" gardens were watered by hand.

Results

Table 1 lists the vegetables grown and monitored in the Vegetable Trials plot in the 2014 harvest year. The table gives both the common names and species epithet as well as an indication of whether data were collected about the cultivar. The table reveals that productivity data was gathered for all but two of the vegetables (celery and edamame) which failed to produce any significant harvest. Evaluation data were collected for the following: cucumbers, eggplant, peppers, both winter and summer squash, tomatoes, sweet potatoes and potatoes. The remainder of this section will focus on first productivity and then evaluative data.

Table 1: Cultivars grown in 2014

Vegetable	**Variety**	**Data** *** Productivity** **# Evaluation**
Beets	'Bull's Blood'	*
	'Touchstone Gold'	*
Carrots	'Yaya'	*
Celery	'Tango'	
Chard	'Perpetual'	*
Cucumber	'Diva'	* #
	'General Lee'	* #
Edamame		
Eggplant	'Dancer'	* #
	Millionaire'	* #
Kale	'Rainbow Lacinato'	*
Leeks	'Lancelot'	*
Lettuce	'Defender Romaine'	*
	'Red Cross Butterhead'	*
	'Slobolt'	*
Onions	'Cipollini'	*
	'Red Torpedo'	*
Peppers	'Ancho Magnifico'	* #
	'Carmen'	* #
	'Lunchbox'	* #
	'Red Knight'	* #
Spinach	'Space'	*
Squash (Summer)	'Squisito'	* #
	'Tromboncino'	* #

Squash(Winter)	'Hunter'	* #
	'Sweet Dumpling'	* #
Sweet Potato	'Beauregard'	* #
	'Covington'	* #
	'Georgia Jets'	* #
Tomatoes	'Bobcat'	* #
	'German Johnson'	* #
	'Green Zebra'	* #
	'Katana'	* #
	'Opalka Paste'	* #
Potatoes	'Adirondack Blue'	* #
	'Adirondack Red'	* #
	'Early Ohio'	* #

Productivity Data

Two types of productivity data can be identified that could be of interest to the home gardener. The first describes the overall quantity (weight) harvested from each sub-plot. The second aspect of productivity of interest to a home gardener concerns the length of time between planting/transplanting and harvest and the amount of time available for harvest. For a home gardener, having early access to a vegetable and having harvest spread over a longer time can be advantageous since both expand the time available for use in the home kitchen and do not burden the gardener with the need to preserve as well as to use a given vegetable at a given, short period of time.

Total Harvest

Records of the total weight were kept each time vegetables were harvested during the growing season. The total weights are reported in Table 2.

Table 2: Total harvest (weight) in pounds

Vegetable	Variety	Total harvest (lbs.)
Beets	'Bull's Blood'	41.88
	'Touchstone Gold'	22.21
Carrots	'Yaya'	18.24
Chard	'Perpetual'	18.03
Cucumber	'Diva'	10.94
	'General Lee'	24.60

Eggplant	'Dancer'	10.59
	Millionaire'	11.72
Kale	'Rainbow Lacinato'	10.19
Leeks	'Lancelot'	35.66
Lettuce	'Defender Romaine'	6.31
	'Red Cross Butterhead'	7.83
	'Slobolt'	9.53
Onions	'Cipollini'	17.81
	'Red Torpedo'	20.44
Peppers	'Ancho Magnifico'	29.42
	'Carmen'	25.38
	'Lunchbox'	12.75
	'Red Knight'	28.31
Spinach	'Space'	0.84
Squash (Summer)	'Squisito'	170.38
	'Tromboncino'	484.31
Squash(Winter)	'Hunter'	123.19
	'Sweet Dumpling'	37.90
Sweet Potato	'Beauregard'	144.40
	'Covington'	59.00
	'Georgia Jets'	72.09
Tomatoes	'Bobcat'	72.53
	'German Johnson'	112.78
	'Green Zebra'	105.34

	'Katana'	124.34
	'Opalka Paste'	79.81
Potatoes	'Adirondack Blue'	3.56
	'Adirondack Red'	22.63
	'Early Ohio'	30.25

While some features of these data are to be expected: the total weight of chard, lettuce and kale is lower than that of larger and more dense vegetables like squash or potatoes, comparisons within each of the common types of vegetables are in some cases quite different and interesting. Since each subplot for the different varieties of tomatoes, squash, peppers, and potatoes are roughly similar in size and subject to roughly comparable cultural forces (water, weeding, etc.) as is the area in the raised beds devoted to different cultivars of beets, lettuce and onions, differences between members of a group are potentially of importance.

Let us look at some groups that show differences among group members, working down the data in Table 2 above.

Beets

The data show that the 'Bulls Blood' cultivar was almost twice as productive as the 'Touchstone Gold' in terms of weight harvested (roughly 42 vs. 22 pounds).

Cucumbers

The 'General Lee' cultivar was roughly twice as productive as 'Diva' in terms of weight harvested (24 vs. 11 pounds).

Peppers

Four types of peppers were grown in the plot in 2014. Three ('Ancho Magnifico', 'Carmen' and 'Red Knight') produced roughly comparable total harvests while the 'Lunchbox' cultivar was substantially lower. The importance of this difference, however, is confounded by the fact that 'Lunchbox' fruit is much smaller than any of the other cultivars. Thus, while the harvest of 'Lunchbox' was prolific, this was not reflected in the total weight.

Squash

There were substantial differences both within the summer and winter squash cultivars as well as between the two types of squash. In this year's crop of four cultivars, the summer squash ('Squisito' and 'Tromboncino') both out-produced the winter cultivars ('Hunter' and 'Sweet Dumpling') by a wide margin. 'Tromboncino' was the overall high producer, with 484 pounds harvested and 'Squisito' coming in second at 170 pounds. The poorest producer of the group 'Sweet Dumpling' weighed in at only 38 pounds.

Sweet Potatoes

The 'Beauregard' cultivar was the most successful of the three sweet potato varieties in this year's crop, producing a harvest of 144 pounds, compared to the 'Georgia Jets' at 72 pounds and the 'Covington' at 59 pounds.

Tomatoes

The five tomato cultivars in the 2014 plot produced a range of outputs, from 72 pounds to 124 pounds. The order observed from largest to smallest harvest was: 'Katana', 'German Johnson', 'Green Zebra', 'Opalka Paste', and 'Bobcat'. The size of the different cultivars did vary, in some cases substantially. Thus, a measure of the total number of fruit produced (vs. the total weight) might have resulted in a different order.

Potatoes

The potato crop was not very successful this year, compared to that of previous years according to the report of Master Gardeners experienced in the Vegetable Trials project. Of the three cultivars grown, even the most successful ('Early Ohio') was less than half the weight of the worst of the sweet potato cultivars. While these two vegetables are of different botanical groups, they are often used in similar ways in North American kitchens and so might be worth comparing.

Time to Maturity and Duration of Harvest

Effective use of home garden produce has dimensions that go beyond simple measures of overall quantity. It is useful to be able to predict how long it will be before vegetables will be available for inclusion in the household diet. An additional feature of interest is the length of time that vegetables are available. When the harvest duration is limited, the home gardener may be overwhelmed by the amount of vegetables available and have to either preserve or give away a substantial proportion of the crop. However, if the harvest duration is lengthy, availability is stretched over a longer period and may be more effectively integrated into the home diet. Table 3 gives an overview of these two pieces of data for each of the cultivars grown in the plot.

Table 3: Date to first harvest and harvest duration

Vegetable	Variety	Duration to first harvest (days)	Harvest duration (days)
Beets	'Bull's Blood'	88	87
	'Touchstone Gold'	81	94
Carrots	'Yaya'	88	42
Chard	'Perpetual'	91	49
Cucumber	'Diva'	91	21
	'General Lee'	73	67

Eggplant	'Dancer'	133	42
	Millionaire'	126	56
Kale	'Rainbow Lacinato'	95	73
Leeks	'Lancelot'	95	84
Lettuce	'Defender Romaine'	88	28
	'Red Cross Butterhead'	81	35
	'Slobolt'	81	42
Onions	'Cipollini'	95	45
	'Red Torpedo'	95	45
Peppers	'Ancho Magnifico'	122	53
	'Carmen'	122	53
	'Lunchbox'	119	56
	'Red Knight'	119	56
Spinach	'Space'	81	14
Squash (Summer)	'Squisito'	84	63
	'Tromboncino'	80	67
Squash(Winter)	'Hunter'	106	41
	'Sweet Dumpling'	112	35
Sweet Potato	'Beauregard'		0
	'Covington'		3
	'Georgia Jets'		3
Tomatoes	'Bobcat'	126	49
	'German Johnson'	126	49
	'Green Zebra'	141	37

	'Katana'	126	38
	'Opalka Paste'	126	49
Potatoes	'Adirondack Blue'	109	0
	'Adirondack Red'	91	18
	'Early Ohio'	130	3

Sorting the data provides some insight into relationships among cultivars with common timelines.

Time to maturity

Table 4 displays the order with which vegetables came to be available in the 2014 plot, gotten by sorting the table above by the first date at which produce was harvested (last column in Table 4).

Table 4: Harvest sorted by date of first harvest

Vegetable	Variety	Seed plant date	Duration to 1st harvest	First harvest date
Beets	'Touchstone Gold'	3/27/2014	81	6/16/2014
Lettuce	'Red Cross Butterhead'	3/27/2014	81	6/16/2014
Lettuce	'Slobolt'	3/27/2014	81	6/16/2014
Spinach	'Space'	3/27/2014	81	6/16/2014
Beets	'Bull's Blood'	3/27/2014	88	6/23/2014
Carrots	'Yaya'	3/27/2014	88	6/23/2014
Lettuce	'Defender Romaine'	3/27/2014	88	6/23/2014
Chard	'Perpetual'	3/27/2014	91	6/26/2014
Kale	'Rainbow Lacinato'	3/27/2014	95	6/30/2014
Leeks	'Lancelot'	3/27/2014	95	6/30/2014
Onions	'Cipollini'	3/27/2014	95	6/30/2014
Onions	'Red Torpedo'	3/27/2014	95	6/30/2014
Cucumber	'General Lee'	4/28/2014	73	7/10/2014
Squash, Summer	'Tromboncino'	4/28/2014	80	7/17/2014
Potatoes, White	'Adirondack Red'	4/17/2014	91	7/17/2014
Peppers	'Lunchbox'	3/24/2014	119	7/21/2014
Peppers	'Red Knight'	3/24/2014	119	7/21/2014
Squash, Summer	'Squisito'	4/28/2014	84	7/21/2014
Peppers	'Ancho Magnifico'	3/24/2014	122	7/24/2014
Peppers	'Carmen'	3/24/2014	122	7/24/2014
Cucumber	'Diva'	4/28/2014	91	7/28/2014
Eggplant	'Millionaire'	3/24/2014	126	7/28/2014
Tomatoes	'Bobcat'	3/24/2014	126	7/28/2014

Tomatoes	'German Johnson'	3/24/2014	126	7/28/2014
Tomatoes	'Katana'	3/24/2014	126	7/28/2014
Tomatoes	'Opalka Paste'	3/24/2014	126	7/28/2014
Eggplant	'Dancer'	3/24/2014	133	8/4/2014
Potatoes, White	'Adirondack Blue'	4/17/2014	109	8/4/2014
Squash, Winter	'Hunter'	4/28/2014	106	8/12/2014
Tomatoes	'Green Zebra'	3/24/2014	141	8/12/2014
Squash, Winter	'Sweet Dumpling'	4/28/2014	112	8/18/2014
Potatoes, White	'Early Ohio'	4/17/2014	130	8/25/2014

Not surprisingly, the plants that were first available for harvest (beets, lettuce, spinach, carrots, chard, kale, leeks, and onions) are commonly designated as cool season crops. It is, however, worth noting not only that they are available early in the growing season but also that their time to maturity is shorter than that of many crops that are commonly called warm weather crops (peppers, eggplant, tomatoes, winter squash). Of the warm weather crops only summer squash and cucumbers have a time to maturity that is of a length comparable to the cool weather crops. This suggests that the home gardener could benefit from the natural growth habit of these plants in planning produce for the table.

Harvest Duration

A second feature that could be of interest to the home gardener is related to the length of the time period over which produce is available for use. Commercial growers may benefit from a homogeneous, limited time of production. It is more efficient to be able to gather all of the vegetables in a given plot during a limited time period. Home gardeners, by contrast, may benefit by having access to a more extended harvest period since it allows them to bring fresh produce to the table for a longer time without the added effort of doing succession plantings. Table 5 gives the harvest duration for the cultivars in the 2014 plot.[1]

Table 5: Harvest duration in days

Vegetable	Variety	Harvest duration (days)
Beets	'Touchstone Gold'	94
Beets	'Bull's Blood'	87
Leeks	'Lancelot'	84
Kale	'Rainbow Lacinato'	73
Cucumber	'General Lee'	67
Squash, Summer	'Tromboncino'	67
Squash, Summer	'Squisito'	63
Eggplant	'Millionaire'	56

[1] Each variety of potatoes and sweet potatoes was harvested only once. This might not necessarily by the situation in a home garden.

Peppers	'Lunchbox '	56
Peppers	'Red Knight'	56
Peppers	'Ancho Magnifico'	53
Peppers	'Carmen'	53
Chard	'Perpetual'	49
Tomatoes	'Bobcat'	49
Tomatoes	'German Johnson'	49
Tomatoes	'Opalka Paste'	49
Onions	'Cipollini'	45
Onions	'Red Torpedo'	45
Carrots	'Yaya'	42
Eggplant	'Dancer'	42
Lettuce	'Slobolt'	42
Squash, Winter	'Hunter'	41
Tomatoes	'Katana'	38
Tomatoes	'Green Zebra'	37
Lettuce	'Red Cross Butterhead'	35
Squash, Winter	'Sweet Dumpling'	35
Lettuce	'Defender Romaine'	28
Cucumber	'Diva'	21
Spinach	'Space'	14

Table 5 reveals considerable variation both for different types of vegetables and even for different cultivars of those types. Four of the early cool season crops (both beets, leeks, and kale) provided a beneficial harvest for much of the growing season while others (spinach, some of the cucumbers and lettuce) were worth harvesting only early in the growing season. Lettuce cultivars differed substantially in their harvest duration, from 28 to 42 days, with 'Slobolt' providing the longest harvest duration as its name suggests. Both summer squash were both available earlier in the season and persisted significantly longer than either of the winter squash. Harvest duration was homogeneous for all four pepper cultivars and largely so for the five tomato cultivars. As with the date of first harvest, harvest duration varied greatly for the two cucumber cultivars, with 'General Lee' being available both earlier and longer.

Evaluation of Plant Health

The cultivars listed below were evaluated by the participating Master Gardeners weekly from June 12, 2014 through September 18, 2014 using a Likert scale ranging from 1 ("perfect condition") through 5 ("dead"). Half were evaluated by the group that met on Mondays; the other half by the Thursday gardeners. To arrive at an overall description, three measures appear in the table below. The median (the "middle" value derived by ordering all evaluations for a given item and taking the middle one) and mode (most frequently occurring value) are used in place of the arithmetic mean because this is

qualitative data for which arithmetic means ("averages") are not appropriate. To give a measure of dispersion, the third column uses the range of values given for each cultivar over the time period.

Table 6: Evaluation of plant health

Vegetable	Variety	Median	Mode	Evaluation range
Cucumber	'Diva'	2.0	2.0	1--3
	'General Lee'	3.0	3.0	2--4
Eggplant	'Dancer'	2.0	2.0	1--4
	Millionaire'	3.0	3.5	2--4
Peppers	'Ancho Magnifico'	1.0	1.0	1--2
	'Carmen'	1.0	1.0	1--4
	'Lunchbox'	1.0	1.0	1--1
	'Red Knight'	1.0	1.0	1--1
Squash (Summer)	'Squisito'	2.0	1.0	1--4
	'Tromboncino'	2.0	1.0	1--4
Squash(Winter)	'Hunter'	1.5	1.0	1--3
	'Sweet Dumpling'	2.0	2.5	1--4
Sweet Potato	'Beauregard'	1.0	1.0	1--4
	'Covington'	1.0	1.0	1--2
	'Georgia Jets'	1.0	1.0	1--2
Tomatoes	'Bobcat'	1.0	1.0	1--4
	'German Johnson'	1.0	1.0	1--3
	'Green Zebra'	2.0	1.5	1--4
	'Katana'	2.0	2.0	1--4

	'Opalka Paste'	2.0	2.0	1--3
Potatoes	'Adirondack Blue'	3.0	3.0	3--4
	'Adirondack Red'	2.0	2.0	2--5
	'Early Ohio'	2.0	2.0	2--5

The table reveals that the cultivars grown and evaluated did well overall. The majority of the modes and medians are in the 1—2 range ("perfect condition" to "slight (less than 15% of fruit & foliage affected)". It was a particularly good year for peppers and sweet potatoes, which received all "1" median/modal ratings. Conversely, it was a less good year for white potatoes, both in evaluation and harvest data. Cucumbers, eggplant, squash and tomatoes showed mixed patterns with some differences among the cultivars grown.

Contributions to the Food Banks

The vegetables from the plant-a-row and most of the produce from the rest of the garden were distributed to community food banks. A total of 1,692 pounds of vegetables went to the Clintonville Resource Center, the Dublin Food Pantry, Heart to Heart (Grandview) and WARM (Westerville).

Summary and Discussion

The 2014 experience in the Vegetable Trials garden provided interesting results. There were substantial differences in productivity as measured by the total weight of the produce and in the time (earliest date available and length of time available) both among the cultivars planted and within a common vegetable type. Differences also existed in the evaluative data on plant health assigned to the cultivars over the period although these differences did not, in general, predict productivity for anything other than the white potatoes and cucumbers.

In addition to these numeric indicators, much was learned in the sharing that was part of the garden experience. Because Vegetable Trials typically includes a variety of cultivars that are not ordinarily commercially available in garden stores, productivity data alone do not provide an adequate overall assessment of the value and acceptability of each species. Typically, Volunteers take a small part of the harvest home and experiment with integrating those vegetables into their home diet. Even in our small group, people differed in their tastes for different varieties. Some of us really liked the 'Green Zebra', tomato which had a tart flavor, a medium size and a firm texture. Others really preferred a traditional red tomato, with its lusher, richly traditional tomato taste. Some of us needed instruction on how to prepare the 'Squisito', a spaghetti squash. The 'Tromboncino' had an unusual shape—with a base bulb like the more common butternut varieties but with a neck that curved and curled, like the tube of a

trombone. This prompted some discussion of how to prepare this unique and delicious summer squash! Thus, we learned a good deal from each other, not only about growing vegetables!

Future Directions

The Vegetable Trials project will continue to experiment with interesting new varieties as we move forward as a research project. To gain some more control, it is planned to try to include a comparison cultivar across years in major categories to get some comparison data about differences in cultural and climatic conditions across years. Long term, there is an interest in also creating and integrating more evaluative data about taste and use into our largely informal process for assessing the harvest. We also want to continue to contribute to our local food banks, adding exposure to these new and unusual vegetables to the broader community.

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Vegetable Trials Volunteers

Special thanks to those indicated by a star (*) in the list below who contributed more than 15 hours to this project in 2014 according to Volunteer Management System (VMS) records:

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