Franklin County Master Gardener Volunteers Vegetable Trials Annual Report 2015

Prepared for Mary Butterfield, 2015 Project Leader

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Executive Summary

The Vegetable Trials project is a research activity of the Ohio State University Extension Service Franklin County 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. This report documents the results of the 2015 growing season, comparing twenty types of vegetables grown in the plot, including one to five varieties of each type. It reports on two types of productivity data (total weight harvested and time available for harvest) and includes evaluative ratings made throughout the growing season.

In 2015, wet, cool weather and some cultural practices caused reduced productivity in the garden. The data show plainly that our 2015 harvest fell considerably below levels for the preceding two years. The report concludes with a discussion of two different approaches to understanding the nature of the problem. The first is related to plot fertility. The second is related to the most difficult to control variable, the weather.

Introduction

The Vegetable Trials are a research activity of the Ohio State University Extension Service Franklin County 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 through working with other Master Gardeners. Most of the produce is contributed to food banks in the Central Ohio community. This report documents the results of the 2015 growing season.

Method

The plot used in the 2015 Vegetable Trials is found within 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. A diagram of the 2015 plot appears in Appendix A.

The plot is organized into the following three areas:

(1) A raised bed that is 4’ by 50’ divided into 13 subplots. The vegetables grown in the raised bed in 2015 included: arugula, lettuce, mustard greens, onions, radish, radicchio, and spinach. A second planting was made of both of the radish cultivars and some of the lettuce crops.

(2) Eleven cultivated field rows, 4’ in width and divided by 3’ paths. Ten of the rows were divided into three 20’ segments. The easternmost row was fashioned into a hill. The types of vegetables grown in 2015 included: beets, carrots, cucumber, eggplant, kale, mustard greens, onions, peppers, white and sweet potatoes, summer and winter squash, Swiss chard, and tomatoes. Most vegetable varieties occupied one row segment. Two exceptions occurred: (1) the three varieties of kale occupied a single row segment, and (2) the peppers occupied only part of each row segment.

In the 2015 harvest year, one segment of one row was donated for use in an OSU study of factors affecting zucchini production. The produce of that segment was also included in the harvest although not discussed in this report.

One row was devoted to edible flowers, in memory of Annette Swanberg, a former, well-loved, member of the group.

(3) Four square foot gardens in a 9' by 9' area. The square foot 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 were included in the harvest donated to the food banks or taken home by the Master Gardeners.

While we did not count the number of plants in each section of the plot, the fact that each variety within a common type of vegetable (e.g., beets, squash) occupied the same amount of space in the plot or raised beds enables us to make a rough comparison of the productivity of the different varieties. There is an exception for the peppers, a difference which will be mentioned within the discussion that follows.

Vegetable varieties were chosen by subcommittees of Master Gardeners during the winter season and acquired from a variety of seed sources including Johnny's Select Seeds, Territorial, Fedco and Steele. White potatoes were started from seed potatoes, and sweet potatoes as slips. The varieties in the raised beds and other greens (chard, kale) and beets grown in the field this year were direct seeded. The onions, grown in both the raised beds and field, were begun in the Chadwick greenhouse along with most of the other varieties (cucumbers, eggplant, peppers, squash, and tomatoes). Varieties in the greenhouse were sown as seeds in FAF Surefire Germination Mix and begun in the OSU greenhouses before being transplanted into the plot. The tomatoes were transplanted into larger pots in the greenhouse six weeks after seeding to encourage growth.

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 is applied as a top layer in the raised bed. For a few weeks after transplanting, row covers were used to protect the eggplant, squash and cucumber plants from insect pests. Once planted, the paths between the rows were covered with wood chip 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 and square foot garden were watered by hand.

Table 1 lists the vegetables grown and monitored in the Vegetable Trials plot in the 2015 harvest year. The table gives both the common names and species epithet as well as an indication of the data collected for each cultivar.

Table 1: Cultivars grown in 2015

Vegetable	Variety	Data * Productivity # Evaluation
Arugula	Sylvette	*
Beets	Pablo	*
	Boldor	*
Carrots	Half Danvers	*
Cucumber	Pepinex	* #
	Summer Dance	* #
Eggplant	Bride	* #
	Traviata	* #
Kale	Improved Dwarf Siberian	*
	Redbor	*
	Red Winter	*
Lettuce	Olga	*
	Revolution	*
	Winter Density	*
Mustard Greens	Dragon Tongue	*
Onions	Summer Isle	*
	Red Bell	*
Pac Choi		*
Peppers	Lady Bell	* #
	Pizza	* #
	Red Ruffled	* #
	Wonder Bell	* #
Radicchio	Rosea di Treviso	*
Radish	Amethyst	*
	Red Head	*
Spinach	New Zealand	*
	Regiment	*
Squash (Summer)	Emerald Delight	* #
	Superpick	* #
Squash(Winter)	Super DeLite	* #
	Waltham	* #
Sweet Potato	Beauregard	* #
	Bunch Porto Rico	* #
	Georgia Jets	* #
Swiss Chard	Electric Neon Blend	*

Tomatoes	Celebrity	* #
	New Girl	* #
	San Marzano	* #
	Sweet 100s	*
	Taxi	* #
	Valencia	*#
White Potatoes	Katahdin	* #
	Kennebec	* #
	Red Pontiac	* #

Results

Table 1 reveals that productivity data will be shown for all but three of the varieties (arugula, pac choi, and the Traviata eggplant) 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.

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	Pablo	11.75
	Boldor	3.38
Carrots	Half Danvers	10.56
Cucumber	Pepinex	58.25

	Summer Dance	40.47
Eggplant	Bride	3.88
Kale	Improved Dwarf Siberian	17.00
	Redbor	3.41
	Red Winter	6.25
Lettuce	Olga	2.06
	Revolution	1.38
	Winter Density	6.44
Onions	Red Bell	34.00
	Summer Isle	20.44
Peppers	Lady Bell	11.72
	Pizza	11.97
	Red Ruffled	5.97
	Wonder Bell	19.88
Potatoes	Katahdin	0.19
	Kennebec	10.66
	Red Pontiac	15.13
Radicchio	Rosea di Treviso	2.56
Radish	Amethyst	4.59
	Red Head	5.47
Spinach	New Zealand	13.34
	Regiment	5.88
Squash (Summer)	Emerald Delight	201.88
	Superpick	26.59

Squash(Winter)	Super DeLite	6.44
	Waltham	70.22
Sweet Potato	Beauregard	75.75
	Bunch Porto Rico	26.88
	Georgia Jets	63.84
Swiss Chard	Electric Neon Blend	13.81
Tomatoes	Celebrity	18.59
	New Girl	16.13
	San Marzano	34.41
	Sweet 100s (Cherry)	9.31
	Taxi	13.44
	Valencia	38.03

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, results within a given type of vegetable are in some cases quite different and interesting and will be described in the section that follows. 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 lettuce and radishes, differences between members of a group are potentially of importance.

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

Beets

The data show that the Pablo cultivar was almost three times as productive as the Boldor in terms of weight harvested (roughly 12 vs. 3.5 pounds). The Pablo variety was a red beet, the Boldor a gold beet. Interestingly, this difference in productivity between red and gold varieties was also observed in the 2014 harvest even though the specific cultivars differed.

Cucumbers

The Pepinex cultivar was roughly one and a half time as productive as Summer Dance in terms of weight harvested (58 vs. 40 pounds). Other important differences between the two will be noted in the sections on timing.

Eggplant

This was not a particularly successful year for eggplant. The more successful of the two cultivars planted, Bride, produced only a little less than four pounds of fruit while the other cultivar, Traviata, produced no usable fruit.

Peppers

Four types of peppers were grown in the plot in 2015. Two (Lady Bell and Wonder Bell) were regular bell peppers, edible in both green and red states. Wonder Bell proved to be the more productive of the two in terms of weight (roughly 20 vs. 12 pounds). Pizza was a small, hot pepper that proved to be as productive as Wonder Bell despite the difference in the size of individual peppers. The outlier among the pepper varieties grown in 2015 was the Red Ruffled. It had a small, flattened fruit. Although the data above make it appear that it produced a very small harvest (6 pounds), it must be noted that this variety was represented by only half the number of plants compared to those of the other varieties because Red Ruffled had germination problems . This would suggest that their productivity on a per plant basis was equal to that of the other larger peppers.

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, one of the summer squash Emerald Delight, a zucchini, out-produced both the winter cultivars (SuperDeLite and Waltham) by a wide margin. The second summer squash, Superpick, a yellow squash, showed the third highest yield, placing after both Emerald Delight and Waltham. The poorest producer of the group Sweet Dumpling weighed in at a total of 6.5 pounds.

Potatoes

The potato crop was not very successful this year. One variety, Katahdin produced less than one pound. The other two, Kennebec and Red Pontiac produced only 11 and 15 pounds respectively. According to our historical records, this was substantially below previous harvests.

Sweet Potatoes

The Beauregard cultivar was the most successful of the three sweet potato varieties in this year's crop, producing a harvest of 76 pounds, compared to the Georgia Jets at 64 pounds and the Bunch Porto Rico far behind at 27 pounds. The order of productivity for Beauregard and Georgia Jets was the same as shown in last year's harvest.

Tomatoes

The five tomato cultivars in the 2015 plot produced a range of outputs, from 38 pounds down to 13 pounds. The order observed from largest to smallest harvest was: Valencia, San Marzano, Celebrity, New Girl, and Taxi. This year's harvest was substantially smaller than previous years. Because this was true of many of the vegetables grown this year, it will be discussed in more detail in the Summary and Discussion section.

The greens

The Master Gardener seed selectors were interested in trying to expand the variety of greens grown in the plot, in part in response to a perceived interest from the food banks to which we ordinarily give the major part of our produce. The greens included were: Sylvette arugula, three varieties of kale, three varieties of lettuce, Dragon Tongue mustard greens, Pac Choi, Rosea di Treviso radicchio, two varieties of spinach and Electric Neon Blend Swiss chard. Several of these were not very successful and produced almost no measurable harvest. These included the arugula, mustard greens, and pac choi. There was a small harvest (2.5 pounds) from the radicchio and a substantial harvest of Swiss chard (almost 14 pounds) and one of the kales. Let us now look at those types of vegetables that had multiple cultivars included.

Kale

Three types of kale were grown in the 2015 plot with equal parts of a single row devoted to each. Nonetheless, the harvest showed a clear differentiation. Two of the cultivars (Redbor, and Red Winter) produced a substantially smaller harvest compared with the third, Improved Dwarf Siberian.

Lettuce

Three types of lettuce were grown in the 2015 plot. Two varieties, Olga, and Revolution produced less than half of the weight harvested from the Winter Density planting.

Spinach

Two types of spinach were grown in the 2015 plot. One, Regiment, is a true spinach that did well compared to many of the other greens but did substantially less well than the New Zealand spinach the harvest of which compared with that of the high producing greens (Swiss chard and the higher producing kale).

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

2015 Cultivars		Days to 1st harvest from seed, slip	Harvest duration (days)
Beets	Boldor	84	63
Beets	Pablo	59	88

Carrots	Half Danvers	91	17
Cucumber	Pepinex	73	32
Cucumber	Summer Dance	84	77
Eggplant	Bride	185	18
Kale	Improved Dwarf Siberian	63	84
Kale	Red Winter	56	84
Kale	Redbor	63	84
Lettuce	Olga	66	4
Lettuce	Revolution	52	18
Lettuce	Winter Density	52	18
Onions	Summer Isle	108	53
Onions (both beds)	Red Bell	112	56
Peppers	Lady Bell	147	56
Peppers	Pizza	154	49
Peppers	Red Ruffled	164	39
Peppers	Wonder Bell	150	53
Potatoes, White	Katahdin	77	0
Potatoes, White	Kennebec	91	21
Potatoes, White	Red Pontiac	91	17
Radicchio	Rosea di Treviso	66	0
Radish	Amethyst	49	105
Radish	Red Head	49	87
Spinach	New Zealand	84	52
Spinach	Regiment	52	18
Squash, Summer	Emerald Delight	80	81
Squash, Summer	Superpick	87	74
Squash, Winter	Super DeLite	108	42
Squash, Winter	Waltham	129	32
Sweet Potato	Beauregard	97	8
Sweet Potato	Bunch Porto Rico	100	18
Sweet Potato	Georgia Jets	97	21
Swiss Chard	Electric Neon Blend	63	84
Tomatoes	Celebrity	140	63
Tomatoes	New Girl	122	81
Tomatoes	San Marzano	147	56
Tomatoes	Sweet 100s	154	49
Tomatoes	Taxi	129	32
Tomatoes	Valencia	143	60

As can be seen in Table 3, there is a lot of detail and considerable differences among both varieties of individuals and cultivars within a given variety. Seeing both pieces of data together provides some interesting contrasts. Pablo beets were both earlier to harvest and were harvestable for a longer period than the Boldor variety. Pepinex cucumbers were much earlier to harvest than were Summer Dance but Summer Dance could be harvested for a much longer time. Taxi tomatoes were among the earliest tomatoes to be available but were available for a substantially shorter time than any other type of tomato. The data from the radish varieties is somewhat misleading since the duration includes the data from both the first (harvest duration 21 days) and second (harvest duration 30 days) plantings.

Sorting the data provides some additional insight into relationships among cultivars with common timelines, some of which will be shown in the tables that follow.

Time to maturity

Table 4 displays the order with which vegetables came to be available in the 2015 plot, gotten by sorting the data by the first date at which produce was harvested (last column in Table 4).

Table 4: Harvest sorted by date of first harvest

2015 Cultivars		Seed plant date	First harvest date	Days to 1st harvest from seed, slip
Radish	Amethyst	4/13/2015	6/1/2015	49
Radish	Red Head	4/13/2015	6/1/2015	49
Lettuce	Revolution	4/13/2015	6/4/2015	52
Lettuce	Winter Density	4/13/2015	6/4/2015	52
Spinach	Regiment	4/13/2015	6/4/2015	52
Lettuce	Olga	4/13/2015	6/18/2015	66
Radicchio	Rosea di Treviso	4/13/2015	6/18/2015	66
Beets	Pablo	5/4/2015	7/2/2015	59
Cucumber	Pepinex	4/20/2015	7/2/2015	73
Kale	Improved Dwarf Siberian	5/4/2015	7/6/2015	63
Kale	Red Winter	5/11/2015	7/6/2015	56
Kale	Redbor	5/4/2015	7/6/2015	63
Spinach	New Zealand	4/13/2015	7/6/2015	84
Swiss Chard	Electric Neon Blend	5/4/2015	7/6/2015	63
Squash, Summer	Emerald Delight	4/20/2015	7/9/2015	80
Tomatoes	New Girl	3/9/2015	7/9/2015	122
Cucumber	Summer Dance	4/20/2015	7/13/2015	84
Squash, Summer	Superpick	4/20/2015	7/16/2015	87
Tomatoes	Taxi	3/9/2015	7/16/2015	129
Beets	Boldor	5/4/2015	7/27/2015	84
Potatoes, White	Katahdin	5/11/2015	7/27/2015	77

Tomatoes	Celebrity	3/9/2015	7/27/2015	140
Onions	Summer Isle	4/13/2015	7/30/2015	108
Tomatoes	Valencia	3/9/2015	7/30/2015	143
Onions (both beds)	Red Bell	4/13/2015	8/3/2015	112
Peppers	Lady Bell	3/9/2015	8/3/2015	147
Tomatoes	San Marzano	3/9/2015	8/3/2015	147
Peppers	Wonder Bell	3/9/2015	8/6/2015	150
Squash, Winter	Super DeLite	4/20/2015	8/6/2015	108
Carrots	Half Danvers	5/11/2015	8/10/2015	91
Peppers	Pizza	3/9/2015	8/10/2015	154
Potatoes, White	Kennebec	5/11/2015	8/10/2015	91
Potatoes, White	Red Pontiac	5/11/2015	8/10/2015	91
Tomatoes	Sweet 100s	3/9/2015	8/10/2015	154
Peppers	Red Ruffled	3/9/2015	8/20/2015	164
Squash, Winter	Waltham	4/20/2015	8/27/2015	129
Sweet Potato	Beauregard	5/26/2015	8/31/2015	97
Sweet Potato	Georgia Jets	5/26/2015	8/31/2015	97
Sweet Potato	Bunch Porto Rico	5/26/2015	9/3/2015	100
Eggplant	Bride	3/9/2015	9/10/2015	185

Not surprisingly, the plants that were first available for harvest (radish, lettuce, spinach and radicchio) are commonly designated as cool season crops and were direct seeded into our raised bed in mid-April and available for harvest early in June. The kale, Swiss chard and one of the beets were planted in the field of our plot two to three weeks later and had a comparable time to harvest, available early in July. One of the warm weather crops, the Pepinex cucumber, was a surprise, having a time to maturity close to that of the cool weather crops.

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.

Table 5: Harvest duration in days

2015 Cultivars		**Harvest duration (days)**
Beets	Pablo	88
Kale	Improved Dwarf	84

	Siberian	
Kale	Red Winter	84
Kale	Redbor	84
Swiss Chard	Electric Neon Blend	84
Squash, Summer	Emerald Delight	81
Tomatoes	New Girl	81
Cucumber	Summer Dance	77
Squash, Summer	Superpick	74
Beets	Boldor	63
Tomatoes	Celebrity	63
Tomatoes	Valencia	60
Onions (both beds)	Red Bell	56
Peppers	Lady Bell	56
Tomatoes	San Marzano	56
Onions	Summer Isle	53
Peppers	Wonder Bell	53
Spinach	New Zealand	52
Radish	Amethyst	51
Radish	Red Head	51
Peppers	Pizza	49
Tomatoes	Sweet 100s	49
Squash, Winter	Super DeLite	42
Peppers	Red Ruffled	39
Cucumber	Pepinex	32
Squash, Winter	Waltham	32
Tomatoes	Taxi	32
Potatoes, White	Kennebec	21
Sweet Potato	Georgia Jets	21
Eggplant	Bride	18
Lettuce	Revolution	18
Lettuce	Winter Density	18
Spinach	Regiment	18
Sweet Potato	Bunch Porto Rico	18
Carrots	Half Danvers	17
Potatoes, White	Red Pontiac	17
Sweet Potato	Beauregard	8
Lettuce	Olga	4
Potatoes, White	Katahdin	1
Radicchio	Rosea di Treviso	1

Table 5 reveals considerable variation both for different types of vegetables and even for different cultivars of those types. [1]

Four of the early cool season crops (beets, kale and Swiss chard) provided a beneficial harvest for much of the growing season while others (all three lettuce varieties, and true spinach) were worth harvesting only for a limited time. Both potatoes and sweet potatoes were not at all ready for harvest until late in the 2015 growing period. Because it is our practice to close the garden at a fixed time, these vegetables had a more limited harvest time than might be available in a home garden. Both summer squash were available earlier in the season and persisted significantly longer than either of the winter squash. The New Zealand "spinach" was available much longer than the true spinach (Regiment). Harvest duration was homogeneous for most of the pepper and tomato cultivars, with the exceptions of the Taxi tomato and Red Ruffled pepper. Taxi tomatoes flourished early but were soon dead. The Red Ruffled peppers were healthy but slow to mature. As with the date of first harvest, harvest duration varied greatly for the two cucumber cultivars, with Summer Dance productive for a much longer period than Pepinex, even though Pepinex started to produce later.

Evaluation of Plant Health

The cultivars listed below were evaluated by the participating Master Gardeners weekly from June 18, 2015 through September 24, 2015 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. Once a cultivar was categorized as "dead" (5), the data analysis was discontinued.

To arrive at an overall description, four measures appear in the table below. The first two provide an estimate of the value which best describe the condition of the cultivar. 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. The fourth column gives the number of times the cultivar was evaluated, providing a re-statement of the length of harvest data. We can see that three of the 23 cultivars had eight or fewer evaluations, suggesting a relatively short time period for the Pepinex cucumber, the Katahdin potato, and the Taxi tomato plants.

Table 6: Evaluation of plant health

CROP EVALUATION 2015*		Median evaluation	Mode evaluation	Evaluation range	No. of evaluations
Cucumber	Pepinex	2	2	1-5	5
Cucumber	Summer Dance	3	4	1-4	13
Eggplant	Bride	3	3	2-3	13
Eggplant	Traviata	4	4	2-4	13

[1] The discrepancy in the calculated harvest duration for the radishes as a result of the second planting was noted in the section on Time to Maturity and Duration of Harvest.

Peppers	Lady Bell	2	2	2-2	13
Peppers	Pizza	2	2	1-3	13
Peppers	Red Ruffled	2	2	1-2	13
Peppers	Wonder Bell	2	2	1-2	13
Potatoes, White	Katahdin	3	3	2-5	6
Potatoes, White	Kennebec	3	3	2-5	10
Potatoes, White	Red Pontiac	3	2	2-5	10
Squash, Summer	Emerald Delight	1	2	1-4	14
Squash, Summer	Superpick	3	3	1-3	13
Squash, Winter	Super DeLite	3	3	1-4	14
Squash, Winter	Waltham	3	3	1-4	14
Sweet Potato	Beauregard	2	2	1-5	12
Sweet Potato	Bunch Porto Rico	2	2	1-5	13
Sweet Potato	Georgia Jets	2	2	1-5	13
Tomatoes	Celebrity	3	2	2-4	13
Tomatoes	New Girl	3	2	2-4	13
Tomatoes	San Marzano	2	2	2-3	13
Tomatoes	Taxi	3	3	2-5	8
Tomatoes	Valencia	2	2	1-3	13

Last year the majority of the modes and medians were in the 1—2 range ("perfect condition" to "slight (less than 15% of fruit & foliage affected)". By contrast, the 2015 median evaluations showed only 11 of the 23 cultivars in the 1—2 range, with the vast majority of those evaluated as "2". Eleven of the 12 remaining received a median evaluation as "3", a label for the condition that is described as "moderate, 16-40% of fruit, foliage affected". This, when paired with the productivity data, provide evidence for a problematic year in the plot. This will be discussed further in the Summary and Discussion section.

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. The majority of the total 793 pounds of vegetables donated to the food banks went to the Clintonville Resource Center.

Summary and Discussion

The 2015 harvest in the Vegetable Trials plot echoes the words of Diana Lockwood's October 25, 2015 Gardening column in the Columbus Dispatch "Worst. Year. Ever." While Ms. Lockwood was speaking primarily of tomatoes, our experience extended to most of our warm weather varieties. The following two tables show this effect clearly. The broad outline is shown in Table 7.

Table 7. Overall productivity comparisons, 2013 to 2015.

Year	Total weight (lbs.)
2013	2115.31
2014	2022.25
2015	954.69

These data show plainly that our 2015 harvest fell considerably below past levels. A more in depth view can be seen in Table 8 that shows the detail underlying these high level effects.

Table 8. Productivity comparisons for 2013 through 2015, by type of vegetable.

Varieties	2015 Harvest		2014 Harvest		2013 Harvest	
	Total (oz.,)	No. varieties	Total (oz.)	No. varieties	Total (oz.)	No. varieties
Beets	242	2	1025.5	2	989	2
Carrots	169	1	291.9	1		0
Cucumber	1579.5	2	568.6	2	3172	2
Eggplant	62	2	357	2	1116	2
Kale	426.5	3	163	1	178	2
Lettuce	158	3	378.7	3	432	4
Onions	1075.5	2	612	2		0
Peppers	792.5	4	1533.8	4	2154	4
Potatoes, White	415.5	3	903	3	2876	3
Radish	161	2		0	120	1
Spinach	307.5	2	13.5	1	0	1
Squash, Summer	3655.5	2	10475	2	6061	2
Squash, Winter	1178.5	2	2577.4	2	4133	2
Sweet Potato	2663.5	3	4407.8	3	3446	3

Swiss Chard	221	1	288.4	1		0
Tomatoes	2078.5	5	7917	5	8945	5

This table includes only those types of vegetables which were grown in at least year 2015 and one other year and had a measurable harvest in those years. In some cases (cucumber, kale, onions, radish, spinach and Swiss chard), the 2015 harvest was not noticeably inferior to that of previous year and in some cases superior. More often, however, the 2015 harvest was only 25-60% of the previously recorded harvest. Some of the variability is, of necessity, a function of the varieties of vegetable planted in a given year. Some varieties were unusually productive. For example, both of the 2015 cucumber varieties were much more productive than either of last year's varieties. Last year's Tromboncino summer squash was notably more productive than any other of those grown in the previous two years. However, with the exception of those outliers, productivity within a group was much more homogeneous, rendering the differences between the years as being of more importance. So what was responsible for the much lower harvest of some of our favorites: eggplant, peppers, white and sweet potatoes, winter squash and tomatoes?

At least two different approaches to understanding the nature of the problem present themselves. The first is related to plot fertility. The second is related to the most difficult to control variable, the weather.

Plot Fertility

Our original working hypothesis about the pervasive growth problem in the plot was our use of wood chips as mulch for weed control. The wood chips used both this year and the preceding year had not been composted for any significant period of time. We believed this may have diminished the nitrogen available to our crop and inhibited plant growth. In addition, plowing the field after last year's harvest would have distributed those chips throughout the plot. To more accurately assess the fertility of the plot, a soil test was ordered in September of 2015 and appears in Appendix B. In brief, only one soil nutrient, potash, was in the optimum range. Soil pH, phosphate, magnesium, and calcium were above optimum. Some level of soil amendment was clearly needed.

Weather

A second source of reduced productivity in 2015 was related to the weather. As the quote from Diana Lockwood's article cited at the beginning of this section showed, our experience was echoed by that of many other Central Ohio gardeners. Our fellow Master Gardener and reference librarian, Steve Herminghausen, created the following table that clearly shows that the 2015 crop year was plagued by both colder than normal and wetter than normal weather at key points in the growing season.

Table 9. Temperature and precipitation during the 2015 crop year.[2]

	2015 Temp	2015 Precip	Norm Temp	Norm Precip	Temp dif from norm	Precip dif from norm
Mar-15	38.3	4.34	41.9	3.02	-3.6	1.32
Apr-15	53.2	4.7	53.1	3.4	0.1	1.3
May-15	67.1	3.87	62.5	4.17	4.6	-0.3
Jun-15	71.2	9.21	71.5	4.01	-0.3	5.2
Jul-15	72.3	4.98	75.2	4.79	-2.9	0.19
Aug-15	71.4	2.97	73.9	3.32	-2.5	-0.35
Sep-15	69.6	3.14	66.8	2.84	2.8	0.3
Oct-15	55.6	3.01	55	2.61	0.6	0.4
		36.22		28.16	-0.15	8.06
		27.18		21.74	0.38	5.44

As the table data clearly show, there was a wetter than usual start to the growing season with the rain from mid-May through mid-June, a factor that could have slowed the establishment of our plants. The tomatoes, peppers, squash and potatoes had been planted into the garden in the balmier climate of mid-May, only to be overwhelmed by wet roots and lower than normal temperatures from mid-May through mid-August. The raised bed crops and chard and kale were planted in the more temperate April 15 through May 15 timeframe and were, perhaps, better able to withstand the precipitation and lower temperatures once we moved past May 15.

Future Directions

Given the preceding discussion, a major initiative for 2016 is to take action to try to improve the plot's productivity.

We're embarking on a two prong approach. First, with the help of Farm Manager Glenn Mills and FCMG volunteer Mark Arnold, four tons of cow manure were plowed into the plot in the late fall. It's believed that this large application of organic material will help with deficiencies--including neutralizing the high pH.

Our second initiative will be to examine the issue of what mulch to use to discourage weeds. In the past, a variety of different mulches have been used in the plot. Alternatives to the wood chips used in 2014 and 2015 include newspaper and cardboard. We will consult with specialists in the Horticulture and Crop Science program to help us evaluate our choices.

[2] 2015 Data from NOAA Monthly summaries maps: https://gis.ncdc.noaa.gov/maps/ncei/summaries/monthly. Norm data from NWS: http://w2.weather.gov/climate/index.php?wfo=iln Location for actual: WCMH TV station, Olentangy north of Ackerman. Location for normals: CMH airport - norms are based on 1981-2010. Temps in Fahrenheit. Precip in inches.

The Vegetable Trials project will continue to experiment with interesting new varieties as we move forward as a research project. We want to explore ways to make the information we gather more broadly available, adding exposure to these new and unusual vegetables to the Central Ohio community. We want to continue to contribute to our local food banks, including providing vegetable varieties that expand the experience of their consumers. We also hope to collect more useful data about our harvest. Where practical, we plan to include the top producer in the preceding year among the varieties grown to get some comparison data about differences in cultural and climatic conditions across years. Long term, there is also an interest in creating and integrating more evaluative data about taste and use into our largely informal process for assessing the harvest.

Acknowledgements

This year marks the end of an era of wonderful leadership by Mary Butterfield. Mary has decided to step back and to re-join the regular crew for the Vegetable Trials project. Lorraine Normore will take on the task of project co-ordination for the 2016 year.

We'd also like to acknowledge the input of many people and institutions to the success of the 2015 Vegetable Trials. Special thanks to Glenn Mills the manager of the Waterman Farm for his support in so many ways, to Jim Vent and members of the OSU Greenhouse staff, and to Mary Maloney, Director of the OSU Chadwick Arboretum and Learning Center. Special thanks this year goes to Steve Herminghausen for his research on and preparation of the table on the weather conditions in 2015 and in the past.

Finally, we would also like to acknowledge the hard work of the FCMG Volunteers listed below who "toiled in the fields" and in particular, those in charge of the Monday and Thursday work sessions, Mary Butterfield and Theresa Merva-Sico.

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 2015 according to Volunteer Management System (VMS) records:

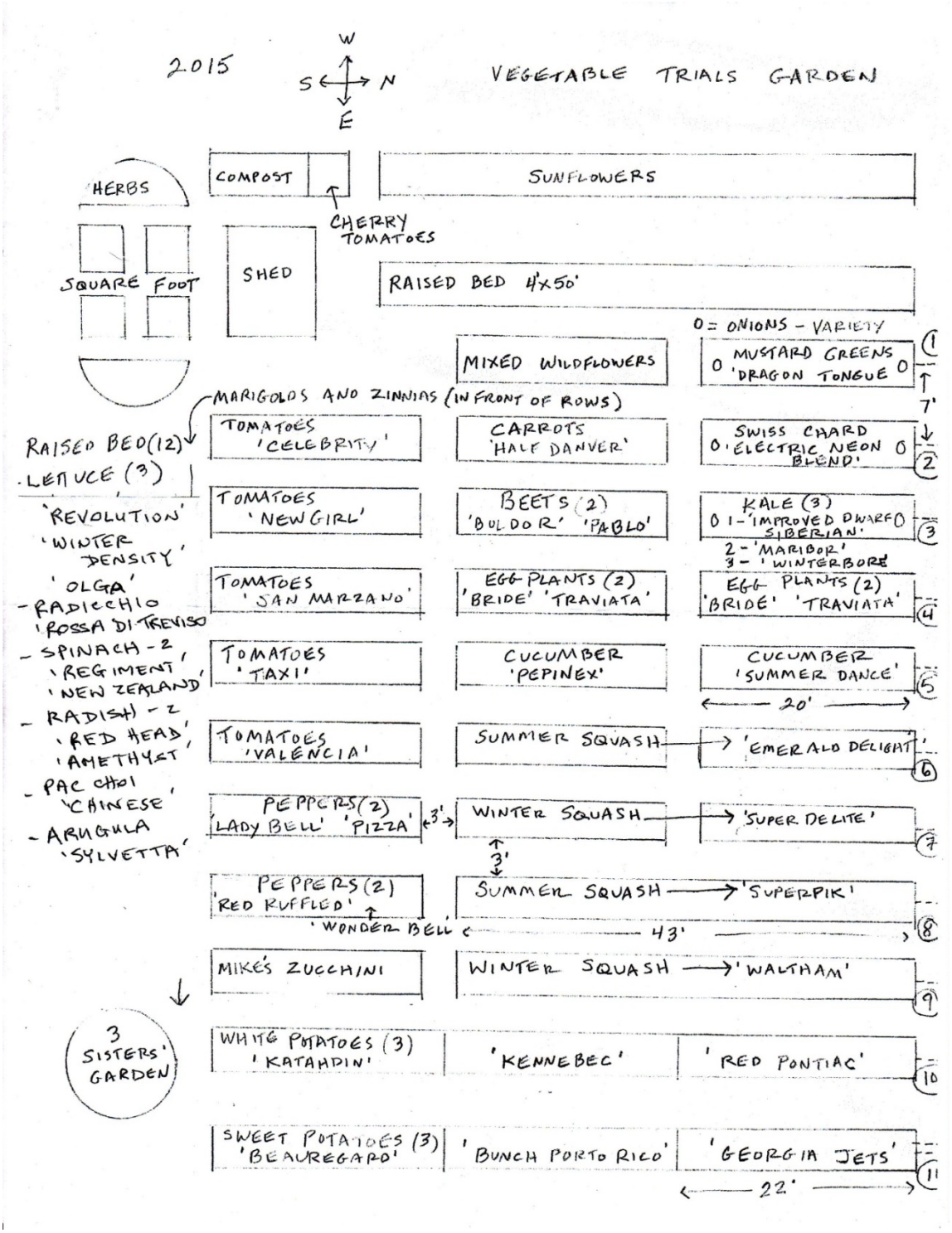
Marcia Armstrong-Burrows*, Karin Arnold, Mark Arnold*, Andrea Aufdencamp, Deb Brower, Mary Butterfield*, Pat Claeys*, Mary Duchi*, Temple George*, Gail Gross-Brown*, Yen Hanes, Gretchen Heinke*, Sharon Huber, Joan Kirschner, Jennifer Kuehn*, Theresa Merva-Sico*, Kathy Nicholson*, Lorraine Normore*, Susan Peck*, Agnes Poteet*, Edie Smith*, Jan Stein*, Richard Stillman*, Mike Sullo, Evelyn Tolliver*, and Ken Zack.

Appendices

A. Plot Layout

B. Soil test results

Appendix A: Plot Layout



Appendix B: Soil Test Results

PENNSTATE

(814) 863-0841 Fax: (814) 863-4540
Agricultural Analytical Services Laboratory
The Pennsylvania State University
University Park, PA 16802
www.aasl.psu.edu

SOIL TEST REPORT FOR:	ADDITIONAL COPY TO:
LORRAINE NORMORE MASTER GARDENER VEG TRAIL-FRANKLIN CTY 82 GARDEN RD COLUMBUS OH 43214	MIKE HOGAN FRANKLIN COUNTY 2105 S HAMILTON RD; SUITE 100 COLUMBUS OH 43215

DATE	LAB #	SERIAL #	COUNTY	ACRES	FIELD ID	SOIL
09/24/2015	S15-34546	38821	OUT OF STATE		Veg Trails Plot	

SOIL NUTRIENT LEVELS		Below Optimum	Optimum	Above Optimum
Soil pH				
Phosphate	(P_2O_5)			
Potash	(K_2O)			
Magnesium	(MgO)			
Calcium	(CaO)			

RECOMMENDATIONS FOR: *mixed vegetables*

Limestone, Calcium And Magnesium Recommendations

Apply the following quantities of limestone, epsom salts and/or gypsum to the soil to correct soil pH, calcium and magnesium levels.

Calcitic Limestone: NONE
(0-3 % Mg)

Magnesium: NONE

Gypsum ($CaSO_4$): NONE

Nitrogen, Phosphate And Potash Recommendations

Apply 0.5 lbs per 100 square feet of UREA and 0.5 lbs per 100 square feet of 0-46-0.

MESSAGES

The above lime and fertilizer recommendations are for this soil sample and this season only. Nitrogen, phosphate and potash recommendations are for fertilizers containing specific ratios of nitrogen (N), phosphate (P2O5) and potash (K2O). As an example 5-10-10 contains 5 % N, 10 % P2O5, and 10 % K2O. If fertilizers with the ratio(s) shown are not available, contact your local garden center or fertilizer supplier for the appropriate substitution.

The Cation Exchange Capacity (CEC) is the capacity of the soil to hold positively charged cations such as K+, Mg ++ and Ca++. If the CEC of your soil is less than 15.0 (see laboratory results below) add one inch of organic matter. If soil pH is greater than 7.0, use acid peat moss as the organic matter source.

pH is high. Use sulfur (see Table on back of report) to lower pH to optimum level of 6.5

LABORATORY RESULTS:										Optional Tests:		
[1]pH	[2]P lb/A	Exchangeable Cations (meq/100g)					% Saturation of the CEC			Organic Matter %	Nitrate-N ppm	Soluble salts mmhos/cm
		[3]Acidity	[2]K	[2]Mg	[2]Ca	[4]CEC	K	Mg	Ca			
7.8	224	0.0	0.9	3.1	14.9	18.8	4.5	16.4	79.1			

Test Methods: [1]1:1 soil:water pH, [2]Mehlich 3 (ICP), [3]Mehlich Buffer pH, [4]Summation of Cations

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Home Garden-1