Evaluation of Organic Heirloom Tomato Varieties

Shubin K. Saha¹, Dan Egel², Maria Restrepo³, Valerie Clingerman³, Scott Monroe³, Hans Schmitz³, Larry Sutterer⁴, and Dennis Nowaskie⁵

¹Vegetable Extension Specialist, Purdue University Department of Horticulture and Landscape Architecture, Southwest Purdue Agriculture Program (SWPAC), Vincennes, Indiana
²Vegetable Pathologist, Purdue University Department of Botany and Plant Pathology, SWPAC
³County Educators, Pike, Knox, Davies, and Gibson Counties, Purdue Extension
⁴Agriculture Technician, Purdue Horticulture and Landscape Architecture, SWPAC
⁵Superintendent, SWPAC

Introduction

Over the past two decades, consumer demand for organically produced fruits and vegetables has been steadily increasing — as much as 20 percent in some years (Organic Trade Association, 2011). Organic produce developed as a small niche, but has grown from approximately 60,000 acres in 1995 to more than 160,000 acres in 2008 (USDA, 2010).

Further developed within the framework of organic vegetable production is the more recent consumer interest in heirloom vegetable varieties (Jordan, 2007). There is currently very minimal information in the scientific literature about heirloom tomato production in an organic system. A recent search reveals only seven scientific articles about this topic. Most recently published this year, a few articles have been published focusing on disease management and grafting (Barrett et al., 2012a; Barrett et al., 2012b; Francis and Stark, 2012; O’Connell et al., 2012; Rogers and Wszelaki, 2012). Of all these publications, none were conducted on certified organic land.

Based on this and the general small amount of scientific literature available on this topic, there is certainly a need for additional information. In particular, there is a need for practical production information for a growing industry. In the scope of this project we evaluated nine organic heirloom tomato varieties and compared to one organic hybrid variety, all produced on certified organic land.

Materials and Methods

On April 3, 2012, the experiment was established when seeds of 10 organic tomato varieties were sown in 50-cell black seedling flats (Myers Industries Lawn and Garden Group, Middlefield, Ohio). The media used for seed germination was Johnny’s Select 512 Organic Mix (Johnny’s Seed, St. Fairfield, Maine). The experiment was conducted in a portion of the certified organic acre located at the Southwest Purdue Agriculture Center in Vincennes, Indiana. This has been certified since 2006 by Indiana Certified Organic.

The cover crop prior to field preparation was hairy vetch, which was incorporated into the soil during ground preparation as one component of the organic fertilizer program. Plots were then flagged to indicate placement of the additional fertilizer that was applied preplant at a rate of 40 pounds of nitrogen per acre using an organic fertilizer material (Nature-Safe, 10-2-8, Cold Spring, Kentucky).
After application, raised-beds were formed and covered in black plastic mulch (4 feet x 2 mil, AEP Industries, Mountain Top, Pennsylvania). Simultaneously the drip tape (12-inch emitter spacing, 24 gph/100 feet, RO-Drip, Roberts Irrigation, San Marcos, California) was placed under the plastic to allow for irrigation during the season. Planting density was 15 plants per plot, rows spaced 6 feet on center and in-row spacing of 2 feet. On May 18, transplants were planted in the field in their designated plots. The experimental design was a randomized complete block design with four replicates.

Plants were harvested six times between July 26 and August 8. Fruit number, weight, and average fruit weight were all collected during harvest. Data was analyzed by Fisher’s least significant difference test using SAS statistical programs (SAS Institute, Cary, NC.)

**Results and Discussion**
The Martha Washington hybrid had greater yield (117.5 lbs/plot) and total fruit number (261.8 fruit/plot) over the entire season compared to any of the heirloom varieties (Table 1). This was an anticipated outcome as the heirloom tomato varieties are grown for their fruit quality characteristics rather than their yields. Increased yield is frequently one benefit of using hybrids. However, lower yields of heirlooms can be offset by higher prices as the current demand for them exceeds the supply in most areas (UK CES, 2009).

The fruit of Martha Washington were smaller than most of the varieties in the trial (Table 1). Among the heirloom varieties, Rose had greater yield (69.8 lbs/plot) than five of the other eight varieties but a similar trend was not present in the total number of marketable fruit (80.8 fruit/plot) (Table 1). The lower fruit number of Rose while having high yield is likely a result of the large average fruit weight (0.85 lbs) (Table 1). Other varieties not significantly different with respect to yield compared to Rose include: Brandywine, Pruden’s Purple, and Moskvich.

Although there are statistical differences among varieties regarding yield, it is apparent that heirloom vegetable varieties selected for cultivation are not chosen solely based on yield. In fact, the fruit quality (including taste, color, and texture) are more important. Having a diverse selection of tomatoes to sell as a commercial producer might be a better marketing option. If looking for both a combination of yield and for an organically produced tomato, the aforementioned varieties could be possible options.

**Acknowledgements**
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Table 1. Organic tomato harvest, 2012.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Total Marketable Fruit Weight per Plot (lb)</th>
<th>Total Non-marketable Fruit Weight per Plot (lb)</th>
<th>Marketable Fruit Number per Plot</th>
<th>Non-marketable Fruit Number per Plot</th>
<th>Average Marketable Fruit Weight (lb)</th>
<th>Average Non-marketable Fruit Weight (lb)</th>
<th>Marketable Fruit Weight per Acre</th>
<th>Marketable Fruit Number per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Martha Washington</td>
<td>117.5 a</td>
<td>32.1 c</td>
<td>261.8 a</td>
<td>77.8 ab</td>
<td>0.45 de</td>
<td>0.4</td>
<td>28,425 a</td>
<td>63,344 a</td>
</tr>
<tr>
<td>Rose</td>
<td>69.8 b</td>
<td>31.1 cde</td>
<td>80.8 cd</td>
<td>39.0 c</td>
<td>0.85 ab</td>
<td>0.8</td>
<td>16,890 b</td>
<td>19,542 cd</td>
</tr>
<tr>
<td>Brandywine</td>
<td>66.7 bc</td>
<td>72.5 a</td>
<td>86.8 cd</td>
<td>85.3 a</td>
<td>0.80 b</td>
<td>1.7</td>
<td>16,143 bc</td>
<td>20,994 cd</td>
</tr>
<tr>
<td>Pruden’s Purple</td>
<td>62.4 bcd</td>
<td>32.0 cd</td>
<td>72.8 cde</td>
<td>41.3 c</td>
<td>0.85 ab</td>
<td>0.7</td>
<td>15,102 bcd</td>
<td>17,606 cde</td>
</tr>
<tr>
<td>Moskvich</td>
<td>57.2 bcde</td>
<td>20.9 ef</td>
<td>149.3 b</td>
<td>63.5 b</td>
<td>0.40 e</td>
<td>0.3</td>
<td>13,825 bcde</td>
<td>36,119 b</td>
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<tr>
<td>Cherokee Purple</td>
<td>51.3 cde</td>
<td>51.2 b</td>
<td>82.0 cd</td>
<td>88.0 a</td>
<td>0.60 c</td>
<td>0.6</td>
<td>12,416 cde</td>
<td>19,844 cd</td>
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<tr>
<td>Great White</td>
<td>47.4 de</td>
<td>53.6 b</td>
<td>52.5 de</td>
<td>66.5 b</td>
<td>0.90 a</td>
<td>0.8</td>
<td>11,474 de</td>
<td>12,705 de</td>
</tr>
<tr>
<td>Valencia</td>
<td>43.8 e</td>
<td>21.1 def</td>
<td>96.0 c</td>
<td>46.3 c</td>
<td>0.50 d</td>
<td>0.4</td>
<td>10,591 e</td>
<td>23,232 c</td>
</tr>
<tr>
<td>Striped German</td>
<td>41.3 ef</td>
<td>14.7 f</td>
<td>39.5 e</td>
<td>17.3 d</td>
<td>0.93 a</td>
<td>0.6</td>
<td>9,987 ef</td>
<td>9,559 e</td>
</tr>
<tr>
<td>Green Zebra</td>
<td>25.8 f</td>
<td>11.2 f</td>
<td>95.3 c</td>
<td>43.5 c</td>
<td>0.23 f</td>
<td>0.2</td>
<td>6,248 f</td>
<td>23,051 c</td>
</tr>
</tbody>
</table>

Plot size: 180 ft².

Means in columns separated by Fisher’s least significant test (P ≤ 0.05). Means with same letter are not significantly different.
Literature Cited


