

## Opportunities with Organic and Heirloom Tomatoes

MAY 2009

### Introduction

Consumers are willing to pay high prices for heirloom tomatoes, and the demand for locally grown, organic heirloom tomatoes almost always exceeds supply. Growing heirloom tomatoes in western North Carolina, especially in an organic system, can be difficult because of disease pressure. There also are fruit quality and production issues that make commercial production unattractive to many farmers. Finding new products to control disease, improving the production system, and identifying the best varieties are necessary to make growing organic heirloom tomatoes a profitable option for more farmers.

Tomato breeder, Randy Gardner has been breeding heirloom-type hybrid tomatoes in an effort to improve some of the poor characteristics of many heirloom tomatoes, e.g., thin skins, tendency to crack, and lack of disease resistance. We have cooperated on heirloom and heirloom-type hybrid tomato studies in conventional and organic systems for over four years. The studies have clearly demonstrated that high quality heirloom tomatoes and organic heirloom tomatoes can be grown in western North Carolina. Randy's improved heirloom-type hybrids are good producers and have excellent consumer acceptance. With strong markets and retail prices of \$2.00 per pound and up, grower interest is very high.

More detailed results from the past four years of trials are summarized on the website <http://ncorganic.org>. This report is a brief overview of the most significant findings.

### How the Research was Done

All the studies were conducted at the Mountain Research Station in Waynesville, NC. In 2005, seven varieties (3 heirlooms and 4 heirloom-type hybrids) were grown in an organic system and seven varieties were grown in a conventional system. The studies were not designed to compare organic with conventional, they were designed to compare how the varieties performed within each production system. In 2006, 2007, and 2008 organic and conventional systems were compared using a split-plot design. In 2006, there was one conventional system and one organic system with six varieties (3 heirlooms and 3 heirloom-type hybrids). In 2007 and 2008, two organic systems, a conventional system, and a control with no pest control were used and 3 heirlooms and 3 heirloom-type hybrids were grown

In the Conventional production system, standard practices recommended by the NC Cooperative Extension Service were used, including synthetic fertilizers, fungicides, and insecticides. The Control plots were fertilized the same as the Conventional plots, but no disease or insect control measures were adopted. Only National Organic Program approved practices were used for the two organic systems which were both fertilized with compost and a balanced fertilizer such as Nature Safe 8-5-5. Neptune's Harvest fish emulsion was applied through the drip-system throughout the growing season. The first organic system was based on Brandt OMRI approved products and used their fungicide Sporatec and insecticide Ecotec along with copper. It is referred to as the Brandt organic system. In the other organic system, Serenade and copper were used for disease control and Neem oil and BT (Dipel DF) for insect control. It is referred to as the standard organic system. All the tomatoes were grown on raised beds with black plastic mulch, drip-irrigation, and high trellises. Plants were evaluated weekly for disease and insect damage. Weekly harvests were conducted and public taste tests were held.

A PUBLICATION OF THE  
FARM PROSPERITY  
PROJECT— IMPROVING  
FARMLAND PROTECTION  
BY INCREASING FARM  
PROSPERITY WITH  
ADOPTION OF HIGH  
VALUE NEW CROPS AND  
AGRICULTURAL  
ENTERPRISES

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## Results and Discussion

Only the 2008 results will be presented here because they are representative of the findings over the four years. The varieties grown in 2008 were the heirlooms Stupice, Mr. Stripey, and Red Brandywine and the heirloom-type hybrids, NC 05114 (Mountain Magic), NC 118L, and NC 161L.

### TOMATO YIELD AND FRUIT QUALITY

There was no difference in total marketable yields among the conventional, standard organic, or Brandt organic production systems, but they all produced significantly higher yields than the control (Figure 1). Disease pressure was not severe in 2008, probably because of the extremely dry conditions. Septoria leaf spot, Verticillium wilt, and bacterial speck were the major diseases present in the study. Disease management measures were necessary, however, as evidenced by the reduction in yield and defoliation of the plants that occurred when no disease control efforts were taken. The Brandt organic system provided good control of Septoria leaf spot, a disease that is becoming more of a problem in western North Carolina. Powdery mildew was also well controlled. Overall, both organic systems were effective at disease and insect control, although the Brandt system was approximately 28% less expensive to use than the standard Organic System. A combination of the products used in both systems might be an effective approach and will be tested in 2009.

Across all production systems, Stupice, Mr. Stripey, and NC 05114 had the highest marketable yields (Figure 2) and NC 118L had the lowest. The heirloom varieties had more burst fruit (19%) than the heirloom-type hybrids (2%), with Mr. Stripey having more than all other varieties. Mr. Stripey (79%), Red Brandywine (76%), NC 118L (74%) and NC 161L (66%) had more cracks than Stupice (14%) and NC 05114 (<1%). Overall, NC 05114 and Stupice had the smoothest fruit.

### TASTE TESTS

Although consumers often report that the heirloom varieties, Brandywine (large, red fruit) and Mr. Stripey (large, red and yellow fruit), are favorite tomatoes, they did not fare well in the 2008 taste tests (Figures 3 and 4)! Stupice, a little known, red salad size heirloom tomato, was consistently the best liked of all the heirloom tomatoes. But it was two of the heirloom-type hybrids, NC05114 (red, salad size) and NC 161 (red, large fruited) that taste test participants rated the highest for flavor.

### ECONOMICS

There are so many variables from farm to farm and market to market, it's almost impossible to come up with an enterprise budget that is meaningful to all growers. The budget included in Figure 5 is from a very easy to use budget template in Excel from Iowa State University. It is recommended that the grower insert his/her own costs of production and market prices to get an estimate of expected returns. The example given is for organic heirloom tomatoes. The yields are the average for all the varieties tested and the pest control costs are the average between the two organic systems tested.

### THE BOTTOM LINE

Production of organic heirloom and heirloom-type tomatoes can be a profitable enterprise for western North Carolina farmers. Currently, most production is on a small-scale and the tomatoes are sold locally to restaurants, natural food stores, and at tail-gate and farmers' markets. Large-scale, wholesale production costs, returns, and marketing opportunities would be quite different.



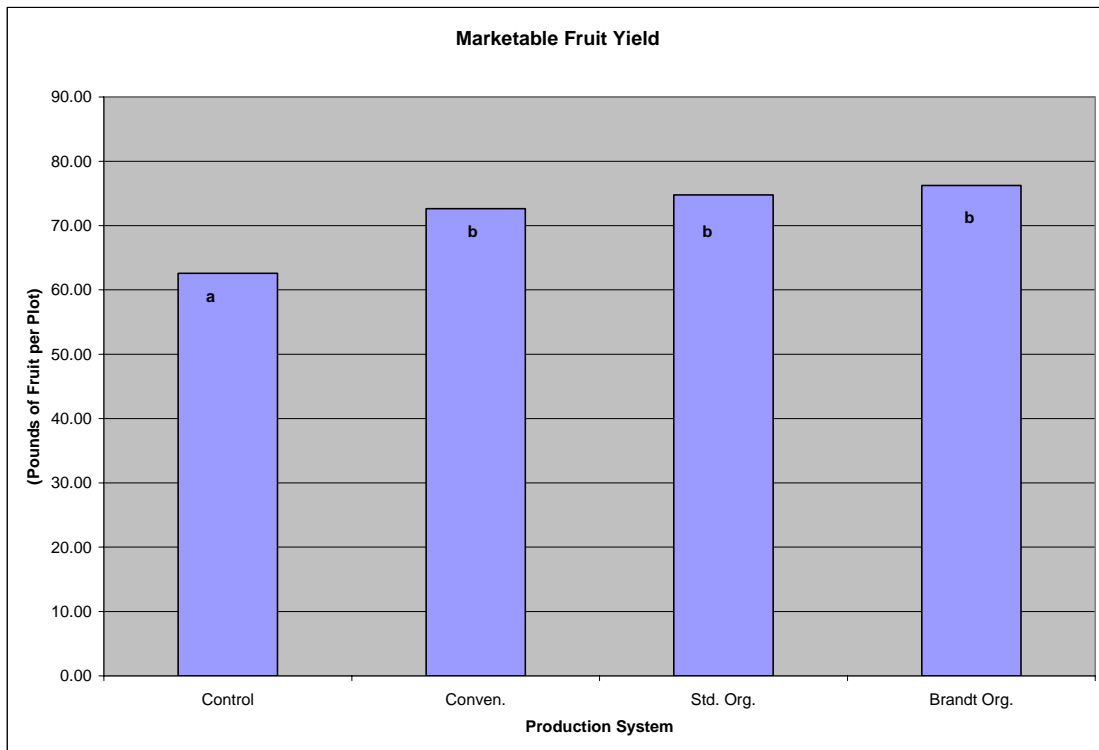


Figure 1. Average marketable fruit yield of tomatoes grown in a control, a conventional production system, a standard organic system, and an organic system based on Brandt organic pest control products.

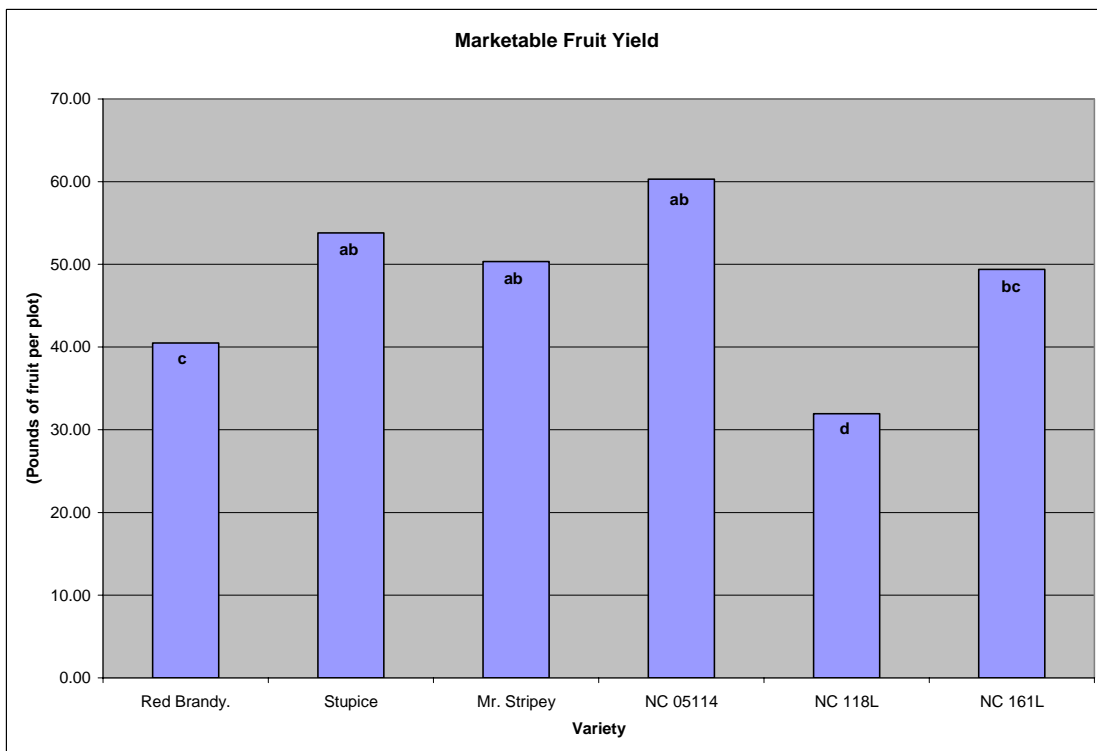


Figure 2. Average marketable fruit yield by variety.

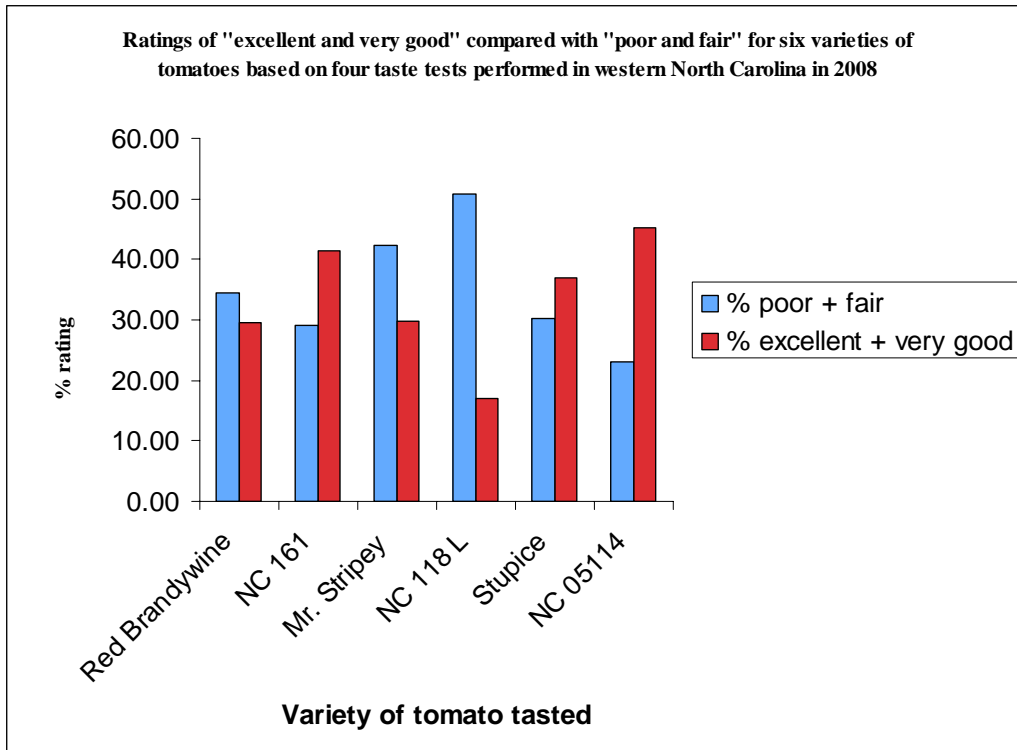


Figure 3. Taste tests results comparing six tomato varieties.



Figure 4. Taste test at the Mountain Research Station 100th anniversary celebration in 2008.



Figure 5. Enterprise budget for 100 feet of row of organic heirloom tomatoes.

Budget template by Craig Chase, Iowa State University. Available at <http://www.agmrc.org/>.

	Quantity	Unit	\$/Unit	Total
Organic Heirloom Tomatoes				
100 foot row (100 plants)				
high trellis, drip and plastic				
<b>Receipts</b>				
Heirloom tomato sales	833	lbs	3.50	\$2,915.50
<b>Total Receipts</b>				<b>\$2,915.50</b>
<b>Planting and Maintenance Year Costs</b>				
<b>Supplies</b>				
Seed - cover crop	0.75	lbs	4.75	\$3.56
Seed	0.25	packet	3.25	0.81
Soil mix	0.25	bag	6.50	1.63
Fertilization	10	lbs	0.28	2.80
Posts	5	posts	3.00	15.00
Wire	250	feet	0.04	9.50
Plastic and Drip	100		0.25	25.00
Pest control products	1		6.80	6.80
Fish Emulsion	0.5	gal	11.00	5.50
<b>Labor Costs</b>				
Field prep	3.00	hrs	10.00	30.00
Transplanting	0.50	hrs	10.00	5.00
Weekly pruning, etc	32.00	hrs	10.00	320.00
Interest on Preplant Costs	425.60	dollars	0.035	14.90
<b>Total Pre-Harvest Costs</b>				<b>\$440.50</b>
<b>Harvest</b>				
<b>Labor</b>				
Harvest labor	8.00	hrs	10.00	80.00
Grading and Packaging	8.00	hrs	10.00	80.00
Clean field	2.00	hrs	10.00	20.00
Other	0.00	hrs	0.00	0.00
<b>Total Harvest Costs</b>				<b>\$180.00</b>
<b>Total Variable Costs</b>				
Per bed				\$620.50
Per lb				0.74
<b>Ownership Costs (Annual)</b>				
Irrigation System				\$1.14
Machinery				7.14
Land				2.29
<b>Total Ownership Costs</b>				<b>\$10.57</b>
<b>Total Costs (Annual)</b>				
Per bed				<b>\$631.07</b>
Per lb				<b>0.76</b>
<b>Annual Returns Over Variable Costs</b>				
				<b>\$2,295.00</b>
<b>Annual Returns Over Total Costs</b>				
				<b>\$2,284.43</b>

Based on costs and yields from the 2008 trial using the lowest prices reported for organic heirloom tomatoes on the direct market in Asheville, NC in August 2008.

**For More Information consult:**

Detailed reports on all the heirloom tomato projects mentioned in this report can be found at <http://ncorganic.org> under “Organic Research at NC State”.

**Grafting for Disease Resistance in Heirloom Tomatoes**

[http://www.ces.ncsu.edu/depts/hort/greenhouse\\_veg/pdf/Grafting.Rivard.pdf](http://www.ces.ncsu.edu/depts/hort/greenhouse_veg/pdf/Grafting.Rivard.pdf)



Fruit from the Organic Heirloom Tomato studies at the Mountain Research Station

Development of this leaflet was funded by a grant from the National Research Initiative of the Cooperative State Research, Education and Extension Service, USDA, Grant #2005-35618-15645.

