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Heirloom Tomatoes at the Kerr Center

2009 Season Observations

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Introduction

Kerr Center revived its horticulture program in 2008 with demonstration trials of heirloom okra and sweet sorghum. In 2009, we continued our focus on heirlooms with plantings of summer squash and tomatoes. This publication presents the results of our tomato trial.

What Are Heirlooms and Why Bother with Heirloom Tomatoes?

“Heirloom” or heritage crop varieties are usually old cultivars, no longer in wide use by large-scale commercial growers. Some are truly hand-me-down selections nurtured by generations of family gardeners; others may be early releases from USDA or land grant university breeding programs that remain in limited use by gardeners and small farmers. One thing everyone agrees on is that all heirloom varieties are non-hybrid and not genetically-engineered. Seed of heirloom varieties can be saved and re-planted with the expectation that the next generation will resemble the parent plant. Despite this common understanding, one person’s heirloom variety may still be another’s modern improved variety.

There are several reasons for our interest in heirloom varieties. Aside from the fact that they are a valuable genetic reservoir for plant breeders, many still perform well in the field. In addition, they often provide profitable production and marketing niches for growers. For example, heirlooms can be marketed to feed the growing consumer interest in alternative and traditional foods and tastes. There



George Kuepper holding a Mortgage Lifter tomato

is also a food security issue. Being able to save and re-plant seed makes the grower less dependent on commercial seed companies.

If you buy your garden seed or transplants from a local source, the selections of tomato varieties are usually limited and rarely include heirlooms. In reality, there are many, many more kinds and cultivars of tomatoes available, but you’ll need to make an extra effort to find them. (For more information on heirloom vegetables, see "Heirloom Vegetables, Genetic Diversity, and the Pursuit of Food Security" at kerrcenter.com/publications/heirloom-report.pdf)





A Bit about Tomatoes

Tomatoes are New World vegetables, whose wild forms probably originated in the Andes Mountains of South America. Cultivated forms had proliferated into Central America and Mexico by the time of Columbus, but were not being grown farther north. By the late 1700s, tomatoes were being cultured in many gardens in Virginia and Pennsylvania. However, not many of these tomatoes were being eaten, because of the persistent belief that they were poisonous. This misconception has basis in fact, since tomatoes are members of the nightshade family (Solanaceae). Plants of the nightshade family are widely known for their alkaloids. Among the most notorious are mandrake, belladonna (deadly nightshade), Jimson weed, and nicotiana (tobacco).

While the nightshade family has many toxic members, it is also replete with food plants. In addition to tomatoes, peppers, Irish potatoes, and eggplant are also solanaceous. This does not mean that these friendly plants are devoid of poisonous alkaloids. Parts of many solanaceous food plants are considered inedible because they are poisonous. Spoiled or “green” potatoes are another example, as these may contain dangerous levels of the alkaloid solanine. The capsaicin in hot peppers is another example of a nightshade alkaloid, but one which is not only tolerated but enjoyed by humans; it even has well-known medical benefits. Still, at high concentrations, capsaicin is a powerful irritant and is the active ingredient in non-lethal pepper spray.

Botanically speaking, tomatoes are fruits; the edible portion is an ovary that contains seeds. Despite this, tomatoes are commonly considered vegetables, in part because, in cuisine, they are used in savory main dishes, not as sweet desserts. Horticulturalists and growers also lump tomatoes in with vegetables because they are cultured as annuals, while most edible fruits are perennials.

This is cold comfort to those of us who got this question wrong on our grade school science exam! However, we can take satisfaction in

knowing that, in 1893, the U.S. Supreme Court declared that tomatoes were vegetables. This decision settled a tariff dispute at a time when duties were required on imported vegetables but not on fruit. The “vegetable or fruit” controversy is crucial to settling another inconsequential argument over which vegetable is most popular. Potatoes are the most popular by far. They are the most widely consumed vegetable in both the U.S. and the world. However, tomatoes are the most popular “fruit vegetable.”

As further evidence of the tomato’s popularity, a Rutgers University survey of farmers markets found that tomatoes were second on the list of vegetables most frequently purchased – barely edged out of the number one slot by sweet corn. A 2009 survey, conducted by the National Gardening Association, found that 86% of gardeners grow tomatoes, making the tomato the most popular homegrown vegetable in America.

Heirloom tomatoes are drawing interest, too. The offerings in heirloom seed catalogs are stupendous. The 2009 Baker Creek catalog listed close to 200 heirloom varieties that included variations like yellow, white, striped, purple, and green tomatoes.

The 2009 Tomato Trial: Location and Methods

Kerr Center’s tomato demonstration trial was planted on the Cannon Horticulture Plots – a five-acre site that began the three-year transition to certified organic status in 2008. The site features a loam soil with moderately poor drainage, about 3.1% native organic matter, and a pH range from 6.5 to 7.0. Phosphorus and potassium levels are low and medium, respectively.

In 2008, the field was planted to a season-long cover crop of sorghum-sudangrass to smother bermudagrass and build the soil. This was followed with a winter cover crop of grain rye, common vetch, and crimson clover, which was mow-killed



Summary of the 2009 Tomato Trials

VARIETY	COLOR	BEST USE	RELATIVE YIELD	MARKETABILITY %	1ST HARVEST
MARMANDE	Red	Fresh Mkt.	Low	Medium	26-Jun
BRANDYWINE	Pink	Fresh Mkt.	Low	Poor	1-Jul
BLACK FROM TULA	Purple	Fresh Mkt.	Medium	Medium	1-Jul
OZARK PINK VF	Pink	Fresh Mkt.	V. High	Good	1-Jul
PRINCIPE BORGHESE	Red Roma	Drying/Canning	High	Good	1-Jul
BEEFSTEAK	Red	Fresh Mkt.	High	Good	1-Jul
EVA PURPLE BALL	Pink-Purple	Multi-purpose	High	Good	3-Jul
MORTGAGE LIFTER	Pink	Fresh Mkt.	High	Medium	6-Jul
CHEROKEE CHOCOLATE	Purple	Fresh Mkt.	Medium	Medium	6-Jul
HOMESTEAD	Red	Fresh Mkt.	Medium	Good	6-Jul
ARKANSAS TRAVELER	Pink	Fresh Mkt.	High	Good	8-Jul
OLD VIRGINIA	Red	Fresh Mkt.	High	Good	10-Jul
T.C. JONES	Yellow	Fresh Mkt.	Medium	Medium	10-Jul
RUTGERS	Red	Canning/Fresh Mkt.	V. Low	Good	13-Jul
BIG MONTH	Red Roma	Canning/Fresh Mkt.	Low	Good	13-Jul
CHEROKEE PURPLE	Pink-Purple	Fresh Mkt.	Medium	Poor	16-Jul
LONG KEEPER	Red	Winter Fresh Storage	*	*	*
* No harvest; see "More about the Varieties"					

April 7. We used the mowed residue as mulch. The cover crop stand was thin, however, so we supplemented the mulch with old hay from the Kerr Center's ranch.

We selected 16 heirloom varieties for our trial. Most were red, pink and purple fresh market types. All were seeded in our greenhouse on March 20 and transplanted to the field on April 30, when soil temperatures reached 67 °F. We laid drip irrigation lines and applied the mulch over the next 10 days. Several weeks of cold heavy rain followed. Fortunately, very few plants were lost. These few were replaced on May 15. Because the plants set out April 30 had grown little during early May's cool weather, those set out on May 15 readily caught up and there were no observable differences

in performance later on.

Varieties were laid out in short plots of three plants each and replicated twice for a total of six plants per cultivar. Transplants were set three feet apart with row spacing of six feet. We elected to use cage culture, rather than stake-and-weave, for reasons of economy. Kerr Center retained a large number of tomato cages from its horticultural program in the late 1990s and we chose to use these. The cages measured 15 inches in diameter and 4 feet in height. All were sanitized in advance using a light chlorine spray.

We seeded buckwheat between the rows on June 8 to encourage pollinators and other beneficial insects, and also to suppress weeds. Adjacent areas of the field were planted to purple-hull peas and



sunflowers, which also support beneficial insect populations. Unfortunately, the late planting resulted in late flowering and the cover crops did not help much with pest control during initial fruit development and early harvest.

All plants received a split sidedress application of custom blended organic fertilizer on April 30 and May 18. We applied, in pounds per acre, a total NPK equivalent of 39–13–18. We sprayed all varieties six times during the season with dilute foliar sprays made predominantly from soluble fish, seaweed, humic acids, and trace minerals.

We provided drip irrigation sparingly and, it appears, unnecessarily. It was a very wet year and the plants were already well mulched. It became clear that our plants were getting too much water and fruit quality suffered accordingly. A symptom we learned to recognize was the upward curling of plant leaves—apparently in an effort to expose the under-leaf stomates to sun and wind to transpire more water.

Weed control required minimal attention. We hand hoed occasionally, though little was needed thanks to mulching and covercrops.

We suffered minor amounts of pest damage with tomato hornworm (*Manduca quinquemaculata*) in mid-June. As fruit developed, we also found significant levels of damage from both tomato fruitworm *Helicoverpa zea*, tomato pinworm (*Keiferia lycopersicella*), and stink bugs (Pentatomidae). Labeled amounts of *Bacillus thuringiensis* (Bt) and a saponin-based surfactant were applied July 3, 7, 14, and 23.

Diseases were much less of a problem and more easily managed. Both septoria blight (*Septoria lycopersici*) and early blight (*Alternaria solani*) appeared during the season. Labeled amounts of Serenade® (*Bacillus subtilis*) and Seacide® (fish oil) were applied at the same time as Bt, and seemed to hold these diseases in check.

Discussion

We were not at all satisfied with our management of insect pests. As already mentioned, we needed an earlier-flowering cover crop to bolster populations of beneficial insects before they are needed in the tomato crop. Also, we needed to begin applying Bt sprays earlier in the season and make more applications.

While insect pests reduced the marketability of some of our tomatoes, radial cracking and splitting were much greater problems. The high incidence of cracking and splitting was a consequence of the rainy growing season and heirloom genetics – few of the old heirlooms have been selected for crack resistance. Mild cracking is not a great deterrent to farmers' market and roadside sales. Severe cracking, however, is unappealing and can affect shelf life. To counterbalance cracking problems, we often harvested fruit slightly early, rather than waiting for "vine ripeness."

We made observations and measured yields through early August. The trial was then terminated due to lack of personnel. It was clear that most varieties would have continued producing up until frost. This early termination, as well as the small size of our trial, limits our final conclusions about these varieties. The table summarizes our observations.

From a commercial perspective, the best-performing varieties were not only those with high yields, but also those with high marketing percentages (reduced cracking and insect damage). The heirlooms that did a good job of meeting these criteria in our trial were Ozark Pink VF, Principe Borghese, Beefsteak, Eva Purple Ball, Arkansas Traveler, and Old Virginia. These criteria are somewhat less critical for home gardeners—especially those pursuing new taste experiences or novelty. Several of the varieties in our trial might fill that need. See the descriptions of individual varieties that follow.



More about the Varieties...

Growth habit is an important characteristic of tomatoes. Most heirloom varieties tend to be indeterminate types. This means that they are more vining, and tend to spread the harvest over a long period of time, often producing ripe tomatoes up until frost. Determinate types are more compact plants whose fruits tend to ripen over a shorter period of time, typically two to six weeks. Determinate types are favored by processors, growers with short marketing windows, and gardeners with limited space.

Marmande

Marmande is a moderately early, semi-determinate, tomato. The fruits are red, slightly ribbed, averaging about 4-6 ounces. The Baker Creek catalog describes it as a popular old French variety, originally developed by the Vilmorin Seed Company. Marmande did not produce well in our trial, but the fruit quality was good.

Brandywine

Brandywine is, perhaps, the most reputable of heirloom tomatoes – touted, particularly, for its distinctive flavor. It is a “potato-leafed” variety. William Woys Weaver writes that potato-leafed tomatoes first appeared in the U.S. in the 1860s, an introduction from France.

According to Weaver, Brandywine did not originate with the Amish, as widely believed, but was a commercial release from the Philadelphia seed company Johnson and Stokes in 1889. Carolyn Male writes that it was named for the Brandywine River in eastern Pennsylvania. There are now several Brandywine varieties in catalogs. Weaver holds that the pink variety is the original Brandywine, and the yellow Brandywine, a true mutation. Amy Goldman, on the other hand, claims that the original Johnson and Stokes release is actually the lesser-known Red Brandywine, which has normal leaves and deep-red fruit; the potato-leafed varieties, she writes, are more

properly known as Sudduth’s or Quisenberry’s Brandywine. Obviously, the genealogy of Brandywine is in some dispute.

In all cases and variants, Brandywine fruits grow large and heavy, but are thin-skinned and not suited to shipping. The pink, potato-leafed Brandywine is prone to cracking and splitting when grown in the South. We grew a selection called OTV Brandywine, which is better adapted to the South, but we still had difficulty producing marketable fruit. Like many of the heirlooms, it is indeterminate and, because of the fruit size and weight, it should be well staked or caged.

Black from Tula

Black from Tula originated in the Ukraine. Goldman writes that it was originally imported from Russia by the Seed Savers Exchange in 1996 and made commercially available in the U.S. in 1998. It is among the better-known *exotic* tomatoes. The fruit has prominent green shoulders, rose-black skin, and chocolate-tinged flesh. The coloring puts some people off, while others are attracted not only by the appearance, but also by the rich “old-fashioned” flavor. The Baker Creek catalog and other sources state that Black from Tula is one of the largest purple varieties, with 8-12 ounce fruits. Our fruits were true to description, but smaller on average. Cherokee Chocolate, the only other dark purple we trialed, was much larger on average.

Black from Tula is indeterminate, with heavy foliage. Male writes that it is more susceptible to early blight than most other tomatoes – something we did not observe in the trial, though the disease was present.

Ozark Pink VF

This pink-fruited variety was originally developed by the University of Arkansas for vine-ripe harvest by market growers and home gardeners. True to catalog descriptions, the fruit is not firm enough for shipping, but is quite resistant to cracking. The eating quality and shelf life were both good. Our plants were also very productive. Ozark



Pink VF was the highest yielding variety in our trial.

Ozark Pink VF has an indeterminate growth habit and was specifically bred for staked production in our hot, humid, and disease prone region.

Principe Borghese

This interesting semi-determinate variety produces a great abundance of small, 1-2 ounce grape and pear shaped fruits. In the Kerr Center trial, the fruits were firm and resisted cracking and splitting quite well. Principe Borghese is especially well suited for sun drying. Apparently, it is common to pull whole branches and hang them outdoors until the fruit dries. (We did not try this, ourselves, and wonder how well it would work in our humid climate.)

In some seed catalogs, such as Pinetree Garden Seeds, this Italian variety is listed separately from the rest of the tomatoes, under foreign vegetables and, unfortunately, gets overlooked.

Beefsteak

The term “beefsteak” is commonly used to describe a *type* of tomato, as opposed to a specific variety. Beefsteak varieties typically produce large, somewhat flattened fruits with thick, solid flesh and few, small seed cavities. According to the Baker Creek catalog, the variety known as Beefsteak is a popular, standard variety, with rich, “old time” tomato taste.

Eva Purple Ball

The origin for this variety is the Black Forest region of Germany, where it is traced back to the 1800s. Like Brandywine and Black from Tula, Eva Purple Ball ranks among the better known heirlooms. Male writes that it is a variety without obvious faults, one that is widely adapted and performs well for just about everyone, everywhere. Both Male and Goldman remark on the consistently shaped globular fruits that typically weigh about 4-5 ounces. It has excellent taste for fresh market uses, but is multi-purpose.

Eva Purple Ball has an indeterminate growth



Old Virginia, left; Beefsteak, right.

habit. The Southern Exposure Seed Exchange catalog claims it is well adapted to hot and humid climates, and has excellent resistance to fruit and foliar diseases. It was certainly one of our best performers!

Mortgage Lifter

There are numerous lines of *mortgage lifter* varieties. It appears that the one we purchased is the interestingly named Radiator Charlie’s Mortgage Lifter – named for the West Virginia breeder, who owned a radiator repair shop in the 1930s. The beefsteak-type fruits are mild tasting, large and smooth, often weighing in at a pound. On the down side, they crack and catface readily. Stems, too, are often hard to remove. These characteristics are apparently shared by all the mortgage lifter varieties. Mortgage Lifter has an indeterminate growth habit and plants tend to grow large.

Cherokee Chocolate

Cherokee Chocolate is a dusky, brownish-colored mutation of the popular Cherokee Purple variety. Chocolate performed better for us than its better-known “sister,” including earlier fruiting. It has an indeterminate growth habit.

Homestead

Homestead was developed in the 1950s for Florida growers. It has good disease resistance and, unlike many heirlooms, is good for shipping. Plants are strong, with a semi-determinate growth habit. The fruits are red, globular, medium-sized,



and resistant to cracking. It did well and came close to being among our better performers.

Arkansas Traveler

Arkansas Traveler is a familiar and popular variety in our region, and has been grown for generations throughout much of the South. It tolerates heat and humidity, and is crack- and disease resistant. Fruits are medium-sized, smooth and pink/rose-colored. The plants are indeterminate. The flavor is good, but considered unremarkable by many.

Old Virginia

The Baker Creek catalog tells us this variety was commonly grown in Virginia during the early 1900s. They suggest it as a good choice for “global-warming era” gardening, because it sets fruit well despite hot summer weather. The dark red fruits are typically 6-12 ounces in size, with an old time sweet/tart taste. Plants are indeterminate.

T.C. Jones

T.C. Jones is a beefsteak fruit type that originated from Kentucky. It was the only yellow-fruited variety in our trial and it proved a favorite for its taste. Its growth habit is indeterminate and the vines grow quite large.

Rutgers

A New Jersey heirloom, with a determinate growth habit, it is considered fairly popular among area gardeners. We were surprised, then, that it did so poorly for us.

Big Month

An Amish heirloom, it is the only true Roma-type we included in our trial. Big Month is so-named because all of its fruit tends to ripen together making a “big month” of harvesting and canning. Its performance was disappointing, though it might have done better in a drier year. According to the Baker Creek catalog, this variety is highly drought resistant. The summer of 2009 was anything but droughty at Kerr Center!

Cherokee Purple

Like Brandywine and a few others mentioned, Cherokee Purple is one of the legendary heirloom tomatoes, touted in good part simply for being delicious. According to Male, the variety is over 100 years old and was supposedly grown by the Cherokee. Its genealogy, however, is questionable. Male laments the confusion and blames it on the embellished descriptions in many early seed catalogs. Apparently the name “Cherokee Purple” captured the imagination of seedsmen and promoters as well as gardeners!

Cherokee Purple is indeterminate and disease resistant, making it a good choice in the South. Fruits are relatively large, about 10-12 ounces. It yielded moderately well for us, but we encountered much cracking and insect damage. With better, more-experienced management, we feel this could be a good choice in markets where heirloom vegetables are appreciated and bring a premium.

Long Keeper

Note that we did not record the performance of Long Keeper in our trial. The fact is we didn’t quite understand what to expect from a winter storage tomato, which does not vine ripen as other tomatoes do. Winter storage tomatoes ripen 6-12 weeks after harvest to ensure a continuing supply of fresh-eating tomatoes into winter. Though their texture and flavor is said to be no match for tomatoes harvested in-season, they are still considered superior to standard supermarket fare.

There are a number of winter storage varieties. The one we tested, Long Keeper, has a semi-determinate growth habit and produces 4-7 ounce fruits that ripen to a reddish-orange color.



Seed Sources for the 2009 Trial

Cherokee Purple, Mortgage Lifter, Black from Tula, Cherokee Chocolate, Marmande, Big Month, T.C. Jones, Homestead, Rutgers, Beefsteak, and Principe Borghese:

Baker Creek Heirloom Seeds
2278 Baker Creek Road
Mansfield, MO 65704
417.924.8917
www.rareseeds.com

Arkansas Traveler, Ozark Pink VF, Eva Purple Ball, Old Virginia, Long Keeper, and Brandywine:

Southern Exposure Seed Exchange
P.O. Box 460
Mineral, VA 23117
540.894.9480
540.894.9481 (FAX)
www.southernexposure.com

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