

# Bell Pepper Cultivar Evaluations for Yield and Quality in Central Kentucky

Brent Rowell, April Satanek, and John C. Snyder  
Department of Horticulture

## Introduction

After completing a two-year (2000-01) evaluation of bell pepper cultivars under induced bacterial spot infection (*Xanthomonas campestris* pv. *vesicatoria* or *Xcv*) and in a bacterial spot-free environment, we began a new series of trials in 2003 to compare new cultivars with a previously recommended, highly resistant cultivar with very attractive fruits (Aristotle). While nearly 100% of the pepper acreage in the state is planted with spot-resistant cultivars having the *Bs2* gene (resistance to *Xcv* races 1, 2, and 3), many new resistant cultivars have been released since 2001. Three of the cultivars in this trial (Revolution, Alliance, and PS9915776 (hereafter referred to as “PS...5776”), reportedly have some tolerance to *Phytophthora capsici*, which is becoming more of a problem in the state. Two cultivars (Heritage and Excursion II) reportedly have resistance to tomato spotted wilt virus (TSWV). This thrips-transmitted disease has become economically important in Illinois and in some southern states in the last few years. All varieties tested have resistance to bacterial spot races 1, 2, and 3 but many have not been tested under epidemic conditions in Kentucky.

Bell cultivars were tested in replicated trials at two locations in 2005 (central Kentucky at Lexington and eastern Kentucky at Quicksand). See also the trial report for the same varieties grown in eastern Kentucky.

## Materials and Methods

This trial was planted at the Horticultural Crops Research Station in Lexington. All twelve cultivars were seeded on 21 March. Seedlings were grown in 72-cell plastic trays and transplanted to the field on 13 May.

The trial field received 57 lb N/acre prior to planting, supplemented by an additional 54 lb N/acre divided into 13 weekly fertigations (111 lb N/acre season total). Potassium was applied prior to planting according to soil test recommendations. Plots consisted of 20 plants in double rows with four replications in a randomized complete block design. All were planted on raised beds with black plastic mulch and drip irrigation. Plants of all cultivars were spaced 12 in. apart in the row with 15 in. between the two rows on each bed. Beds were 6 ft apart from center to center. A tank mix of maneb plus fixed copper was applied biweekly until mid August for bacterial spot protection. Three applications of synthetic pyrethroid insecticides and one application of spinosad were made for European corn borer control.

Eleven new bell cultivars with the *Bs2* gene were compared with main season control Aristotle (Table 1); six of these were also tested in 2004. Mature green fruits were harvested only three times from 11 July to 10 Aug. Marketable fruits were graded and weighed according to size class (U.S. No. 1 extra large, large, medium). We also weighed misshapen fruits that could be marketed to foodservice as ‘choppers.’

**Incomes.** Yields in each size class were multiplied by their respective wholesale market prices to determine gross returns (income) for each cultivar. Weekly wholesale prices from

Cumberland Farm Products Cooperative for 2004 were used to calculate incomes from the different cultivars. The income variable has been a good indicator of a cultivar's overall performance, taking into account yields of the different size classes and their price differentials. Earlier maturity usually results in higher prices and incomes.

**Fruit appearance ratings.** All pepper fruits harvested from two replications at the second harvest (26 July) were laid out on tables for careful examination and quality ratings on July 28. Overall appearance ratings took several things into account including, in order of importance: overall attractiveness, shape, smoothness, degree of "flattening", color, and uniformity of shape.

## **Results and Discussion**

Total marketable yields, gross incomes, and fruit quality characteristics are shown in Table 1. The 2005 growing season was unusually hot and dry and total marketable yields were low, ranging from 9 to 16 tons/acre (600 to 1066 boxes/acre). Consequently, incomes were also lower than in previous years ranging from \$2131 to \$3703/acre. The group of highest yielding and highest income varieties included Double-up, Socrates, Heritage, Aristotle, and PS...5776 (Table 1). Unlike 2004, yields of Revolution were very low in 2005--perhaps a result of a large percentage of culls due to flattening of fruits in response to hot weather.

Fruit quality characteristics for bell cultivars are also shown in Table 1. The hot weather resulted in flattening of a large percentage of fruits in some varieties (see "Comments" in Table 1) which resulted in lower appearance scores. Aristotle, with no flattening, received the highest appearance rating while PS...5776, Heritage, and Telestar had little flattening and high appearance scores. Other cultivars that received acceptable ratings or 5.0 or better included Double-up, Excursion II, Patriot, Alliance, E41.8338, and Mahi; one-fourth to one-third of the fruits of these varieties were flattened. Socrates and Revolution appeared to be most susceptible to flattening (up to 50%) and received the worst appearance scores (Table 1). While heat related flattening will not be a problem every year, growers should be aware that some varieties are much more susceptible to this problem than others.

Cultivars that had the highest yields, incomes, *and* acceptable or better fruit quality ratings were Aristotle, Double-up (but many 3-lobed fruits), Heritage, and PS...5776. Aristotle and Heritage fruits were mostly 4-lobed and appeared to tolerate heat without flattening; Telestar and PS...5776 were also heat tolerant but had larger percentages of 3-lobed fruit. Growers should consider these results together with those reported in 2004 and from the sister trial in eastern Kentucky in 2005.

## **Acknowledgment**

The authors would especially like to thank Darrell Slone and the farm crew for their hard work and generous assistance with this trial.

Table 1. Yields, gross returns, and appearance scores of bell pepper cultivars in Lexington, Kentucky; yield and income data are means of four replication

Cultivar	Seed Source	Total mkt. yield <sup>1</sup> (tons/A)	% XL + Large <sup>2</sup>	Income <sup>3</sup> (\$/acre)	Shape unif. <sup>4</sup>	Overall appearance <sup>5</sup>	No. lobes <sup>6</sup>	Fruit color	Comments
Double-up	SW	16.1	76	3703	3.2	5.0	3-4	Med	25% flattened; many 3-lobed
Socrates	SM	15.7	63	3586	2.5	4.5	4	Lt-med	50% flattened, pumpkin-shape
Heritage	HM	15.3	72	3843	3.5	5.8	4	Med	Very few flattened
Aristotle	SM	14.5	67	3323	3.7	6.5	4	Med-dk	No flattening
PS...5776	SM	14.4	67	3142	3.5	6.0	3-4	Med	Very few flattened 33% flattened; some 3-lobed
Excursion II	AC	13.6	69	3063	3.2	5.0	3-4	Med-dk	color
Patriot	HM	12.7	67	2777	3.2	5.0	4	Med-dk	25-33% flattened
Alliance	HM	12.1	62	2775	3.0	5.5	4	Med-dk	33% flattened, otherwise nice
Telestar	HA	11.7	62	2581	3.7	6.0	3-4	Med	Many 3-lobed; few flattened
E41.8338	EZ	11.1	74	2670	3.0	5.5	4	Lt-med	10-25% flattened
Mahi	EZ	10.1	64	2131	2.5	5.5	4	Med	25% flattened, otherwise nice
Revolution	HM	9.0	56	2131	2.5	4.5	4	Med-dk	33-50% flattened
<i>Waller-Duncan</i>									
<i>LSD (P = 0.05)</i>		2.9	777						

<sup>1</sup>Total marketable yields of U.S. Fancy and No. 1 fruits of medium (>2.5 in. diameter) size and larger plus misshapen, but sound fruit that could be sold as 'choppers' to foodservice buyers.

<sup>2</sup>Percentage of total yield that was extra-large (>3.5 in. diameter) and large (>3 in. diameter but ≤ 3.5 in. diameter).

<sup>3</sup>Income = gross returns per acre; average 2004 season local wholesale prices were multiplied by yields from different size/grade categories: \$0.17--0.19/lb for extra-large, \$0.09-0.14/lb for large and mediums, and \$0.05-0.11/lb for 'choppers', i.e. misshapen fruits.

<sup>4</sup>Average visual uniformity of fruit shape where 1=least uniform, 5=completely uniform.

<sup>5</sup>Visual fruit appearance rating where 1=worst, 9=best, taking into account overall attractiveness, shape, smoothness, degree of flattening, color, and shape uniformity; all fruits from two replications observed at the 2nd harvest (26 July).

<sup>6</sup>3-4=about half and half 3 and 4-lobbed; 3=mostly 3-lobed; 4=mostly 4-lobed.