

1-2018

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Bell Pepper Cultivar Evaluation, 2017

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Bell peppers can be profitable for Kentucky farmers. This replicated trial evaluated 12 bacterial spot-resistant bell pepper varieties in comparison to the industry standard, Aristotle. Some of the newer varieties have resistance to ten races of bacterial spot, while Aristotle has resistance to three. Resistance to a greater number of races makes production easier and can reduce the number of bactericide sprays, but the varieties still have to yield well and have the quality that buyers require.

Materials and Methods

Varieties were seeded on 21 March into plastic plug trays (72 cells per tray) filled with Jiffy Seed Starting Mix 17 (Jiffy Products of America, Lorain, OH) at the UK Horticultural Research Farm in Lexington. Greenhouse-grown transplants were set into black-plastic-covered, raised beds using a water wheel setter on 17 May. Each plot was 15 ft. long and contained 30 plants set 12 in. apart in double rows spaced 15 inches apart in the bed. Beds were 5 ft. apart. Fifty pounds of nitrogen/A as urea was applied prior to plastic laying. At planting each transplant was watered in with a pint of starter solution (6 lb. of 10-30-20 in 100 gallons of water). Calcium nitrate was applied via fertigation weekly at a rate of 8.2 lbs. nitrogen/A from 12 June through 23 August. Dual II Magnum herbicide was applied between beds following transplanting. Four early-season bactericide/ fungicide applications of Badge SC (fixed copper) plus Manzate Pro-Stick were made between 23 May and 27 June. Danitol was sprayed for brown marmorated stink bug control on 10 August.

The plot was harvested three times: 11 July, 1 August, and 27 August. Marketable fruit were weighed and graded according to the size classes U.S. Fancy (>3 in. diameter), U.S. No. 1 (>2.5 in. but <3 in. diameter), and U.S. No. 2 (<2.5 in. diameter plus misshapen but sound fruit which could be sold as 'choppers' to food service buyers) and cull fruit.

Results

Average daily temperatures and rainfall for June and July were near normal. Average daily temperatures were two degrees below normal for August, with near normal precipitation.

The best performing bell pepper varieties in this trial were **Turnpike, Aristotle, Green Flash, Boca, Alliance and Currier**. Varieties are ranked in Table 1 by the total marketable yield for the entire trial. Yields of the seven highest-yielding varieties were not significantly different. Six of these also had the greatest yields of U.S. Fancy fruit, and these yields, too, were statistically similar.

Aristotle, which has been the primary bacterial spot-resistant pepper in Kentucky for a number of years, was second in total yield, at just under 27 tons/A. Turnpike had 27 tons/A. Both varieties had similar ratings for appearance and other characteristics, although both had lower four-lobed fruit percentages and blockiness ratings (Table 2), than nearly all the other varieties. Green Flash had the third-highest total marketable yield, and decent ratings for overall appearance, percent of four-lobed fruit, and dark green color. Boca had the fourth-highest total yield, and

had some of the highest ratings for appearance, fruit shape uniformity, blockiness and deep green color. Currier was the sixth-highest in total marketable yield, but had the highest blockiness rating, and was tied with Boca for the highest overall appearance and shape uniformity ratings. Currier and Boca had some of the highest percentages of U.S.Fancy fruit as well (Table1).

Nearly all of the top overall-yielding varieties also were the top yielders in the first harvest on 11 July (Table 4). Thus, these varieties are good choices for growers looking for larger, early-season yields when the prices are higher. At the middle harvest, nearly all varieties increased their yields of Fancy and No. 2 fruit at the expense of the No. 1 grade (Table 5). The top overall-yielders Aristotle, Bastille and Currier were top-yielders in the last harvest, while Karisma, Boca, and Green Flash dropped off in yields (Table 6). Aristotle was the only variety to remain among the top four yielders in all three harvests, attesting to its track record as a top pepper variety (Tables 4, 5, 6), although Turnpike, Green Flash, and Alliance also maintained yields. In addition, Aristotle, Green Flash, Alliance, Currier, and Bastille all maintained about 70 to 80% Fancy plus No. 1 fruit across all three harvests (Table 7). Among these, Green Flash and Alliance ranked well for color and fruit appearance, Currier ranked well for shape uniformity, appearance, and blockiness and Bastille ranked well for number of four-lobed fruit, blockiness, and color. Growers interested in consistent production throughout the season for farmers market or CSA sales should consider these varieties.

Note that Turnpike, Green Flash, Boca and Alliance have substantially better resistance (Table 3) to a greater number of races of bacterial spot than Aristotle. This trial was conducted using a good early spray program for bacterial spot, so varietal resistance was not tested in this evaluation.

Acknowledgments

The authors would like to thank the following persons for their hard work and assistance in the successful completion of this trial: Joseph Tucker, John Walsh, Dave Lowry, Grant Clouser, Steve Diver, Mohammad Dawood, Ammar Al Bayati, Somjintana Sutthithanakool and Kanokwan Khanthawong.

Funding for this project was provided by a grant from the Kentucky Horticultural Council through the Agricultural Development Fund.

Table 1. Total yields and yields by USDA grades, 2017.

Variety	Total Marketable Yield (lb/A) ¹		U.S. Fancy (lb/A) ²		U.S. No. 1 (lb/A) ³		U.S. No. 2 (lb/A) ⁴		Culled Fruit (lb/A) ⁵		Fancy + No. 1 as % of Total Mkt. Yield
	Yield	Grade	Yield	Grade	Yield	Grade	Yield	Grade	Yield	Grade	
Turnpike	54,000	a	34,100	ab	6700	bc	13,200	bcd	3700	ab	76
Aristotle	53,800	a	29,600	abc	7000	abc	17,300	ab	1700	abc	68
Green Flash	53,000	a	35,200	a	6500	bc	11,400	cde	1400	bc	79
Boca	51,400	ab	33,400	ab	7600	abc	10,400	de	1600	bc	80
Alliance	50,000	abc	33,100	ab	1600	f	15,400	abc	3400	abc	69
Currier	48,700	abcd	33,000	ab	4800	cde	10,900	de	2500	abc	78
Bastille	45,500	abcd	25,800	bcd	6300	bcd	13,400	bcd	3800	ab	71
Karisma	44,500	bcd	22,800	cd	3100	ef	18,600	a	2500	abc	58
Dazzle	44,000	bcd	22,300	cd	9700	a	12,100	cd	1200	c	73
SDY 48	42,300	cd	27,300	abc	6100	bcd	8900	de	3900	a	79
Lafayette	42,100	cd	27,600	abc	3600	def	10,900	de	3900	a	74
Galleon	41,100	de	25,400	bcd	8200	ab	7500	e	1300	c	82
Mariner	33,700	e	18,400	d	2700	ef	12,600	cd	1700	abc	63

¹Includes yields of U.S. Fancy, No. 1, and No. 2 fruits.

²U.S. Fancy=undamaged, unblemished fruit >3 in. dia.

³No. 1= undamaged, unblemished fruit >2.5 but <3 in. dia.

⁴No 2=undamaged, unblemished fruit <2.5 in. dia., plus larger, but misshapen yet sound fruit which could be sold as 'choppers' to food service buyers.

⁵Fruit of any size with surface scarring, sunscald, insect and disease damage.

Table 2. Fruit characteristic ratings.

Variety	Cull (%)¹	Silvering (%)²	Uniform Fruit Shape³	Fruit Appearance⁴	4-lobed fruit (%)	Blockiness⁵	Green Color⁶
Turnpike	6	1	4	3.7	30	2.8	3.7
Aristotle	3	6	3.7	3.8	23	3.2	3.6
Green Flash	3	1	3.7	4.0	55	3.5	4.2
Boca	3	3	4.3	4.2	35	4.0	4.2
Alliance	6	1	3.8	4.0	55	3.8	4.1
Currier	5	3	4.3	4.2	58	4.3	3.8
Bastille	8	5	3.7	3.8	65	4.1	4.2
Karisma	5	4	3.1	2.8	30	3	2.4
Dazzle	3	14	3.1	3.1	60	3.5	3
SDY 48	8	1	3.9	4.0	55	4.1	4.2
Lafayette	9	0	3.9	3.9	53	4.1	3.2
Galleon	3	7	3.5	3.8	63	3.6	4.4
Mariner	5	3	4	4.0	70	3.8	4.1

¹Percent of all harvested fruit culled due to surface scarring, sunscald, insect and disease damage.

²Percent of total marketable yield in the 1st harvest that showed slivering or very fine, light colored streaking.

³Uniformity of fruit shape: 1=poor, 5=excellent.

⁴Fruit appearance: 1=poor, 5=excellent.

⁵1=long, slender fruit or very squat, flattened fruit, 5=fruit with equal height and width.

⁶1=pale green, 5=dark green.

Table 3. Variety attributes.

Variety	Seed Source	Days to Harvest ¹	Ripe Fruit Color	Disease Resistances ^{2,3}	Fruit Comments
Turnpike	ST	75	red	HR: BS (1-5, 7-9), TMV, Phyt	Attractive; culls due to sunscald
Aristotle	ST	70-75	red	IR: BS (1-3), PVY, TMV	Attractive; blocky to long; a lot of pointy fruit
Green Flash	CF	mid	red	IR: BLS 1-10	Attractive; uniform color; tall/blocky; very productive; more scarring than other varieties
Boca	SW	73	red	HR: BLS 1-10	Many 3-lobed; 1 w/ ringspot; Many squat fruit second harvest
Alliance	HM	74	red	HR: BS (1-5), PVY, PYMV, TMV, PMV, IR: CMV	Blocky- to long-blocky; some extremely large fruit; good size at third harvest
Currier	SW	73	red	HR: BS (1-3), PMV, PVY (0, 1,1-2), TMV; IR: CMV, Phyt	Attractive, variable shape; variable color; good size at 3 rd harvest; has very thick walls
Bastille	SY	75	red	HR: BS (1-5,7-9), PMV, TMV	Variable shape; many culls from ripe rot
Karisma	CL	71-75	red	HR: BS (1,2,3), PVY (0,1), TMV PMV; IR:CMV	Very pale green color
Dazzle	SW	-	yellow	HR: BS (1-5); IR: TSWV	Glossy; many squat fruit
SDY 48	SW	73	red	IR: BS (1-10)	Uniform color; culls from sunscald and ripe rot
Lafayette	CL	70	yellow	HR: BS (1-3)	Very pale green; many squat/flat fruit; culls from sunscald; many squat/flat; 5% stinkbug
Galleon	CF	mid-late	yellow	HR: BS (1-10)	Color varies on some fruit; some virus
Mariner	CF	early	red	IR: BS (1-10)	No squat fruit; few puckered fruit

¹Days to harvest as listed by seed companies.

²HR=disease resistant (restricted disease development & symptoms); IR=intermediate resistance (may show more disease symptoms than 'resistant' varieties grown in same environment).

³BS=bacterial spot (strains 1-10); Phyt=phytophthora root rot; TMV=tobacco mosaic virus; PVY=potato virus Y (strains 0, 1, and 1-2); PMV=pepper mottle virus; PYMV=pepper yellow mottle virus; CMV=cucumber mosaic virus; TSWV=tomato spotted wilt virus.

Table 4. Yields of first harvest, 11 July.

Variety	Total Marketable Yield (lbs) ¹	Percent of Total Mkt. Yield		
		Fancy (%)	No. 1 (%)	No.2 (%)
Alliance	10900	67	5	28
Boca	10200	53	30	17
Aristotle	9900	51	20	29
Karisma	9600	50	11	39
Turnpike	7000	55	28	17
Green Flash	6800	42	34	24
SDY 48	5900	47	37	16
Bastille	5800	50	26	24
Currier	5600	58	12	30
Mariner	5500	40	20	40
Lafayette	5200	63	15	22
Galleon	4500	42	45	13
Dazzle	3500	51	33	16

¹Combined weights of Fancy, No. 1 and No. 2 fruit.

Table 5. Yields of middle harvest, 1 August.

Variety	Total Marketable Yield (lbs) ¹	Percent of Total Mkt. Yield		
		Fancy (%)	No. 1 (%)	No.2 (%)
Green Flash	35700	66	1	33
Turnpike	33400	60	4	35
Boca	31600	62	3	35
Aristotle	29900	73	5	23
Karisma	28800	74	4	23
Alliance	27700	60	15	24
SDY 48	27300	71	11	18
Galleon	26800	74	6	20
Dazzle	26500	55	3	42
Currier	25700	74	5	21
Mariner	20900	61	4	34
Bastille	20800	73	8	19
Lafayette	20600	68	7	25

¹Combined weights of Fancy, No. 1 and No. 2 fruit.

Table 6. Yields of last harvest, 27 August.

Variety	Total Marketable Yield (lbs) ¹	Fancy (%)	No. 1 (%)	No.2 (%)
Bastille	18900	66	6	29
Currier	17400	46	26	27
Lafayette	16300	52	22	25
Aristotle	14000	52	32	16
Dazzle	13900	63	18	19
Turnpike	13500	32	32	36
Alliance	11500	44	33	23
Green Flash	10600	55	18	26
Galleon	9800	34	20	46
Boca	9600	56	12	33
SDY 48	9100	47	9	44
Mariner	7300	49	20	31
Karisma	6100	56	17	27

¹Combined weights of Fancy, No. 1 and No. 2 fruit.

Table 7. Combined percentages of U.S. Fancy and No.1 fruit at each harvest.

Percent of U.S. Fancy + No. 1 Fruit			
Variety	1 st Harvest	2 nd Harvest	3 rd Harvest
Turnpike ¹	83	64	64
Aristotle	71	78	84
Green Flash	76	67	73
Boca	83	65	68
Alliance	72	75	77
Currier	70	79	72
Bastille	76	81	72
Karisma	61	78	73
Dazzle	84	58	81
SDY 48	84	82	56
Lafayette	76	75	74
Galleon	87	80	54
Mariner	60	65	69

¹Ranked by total-season yield.