

# Cultivar Assessment for Bacteria Spot of Pepper Resistance in South Florida



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## ABSTRACT

Bacterial spot (BS) of pepper, caused by the plant pathogen *Xanthomonas euvesicatoria*, is the most common and problematic foliar disease Florida pepper growers contend with. Therefore commercially available bell pepper (*Capsicum annuum* L.) cultivars with varying degrees of BS resistance were evaluated using a randomized complete block design and 4 replications during the fall of 2015 in Ft. Pierce. Investigators measured disease incidence, yield by fruit grade, and the following postharvest fruit characteristics; number of lobes, length, width, thickness, cracking, and bruising susceptibility. This trial was conducted on a commercial pepper farm using standard grower production practices for the region including seepage irrigation, fumigated plastic mulched beds, two rows of plants with nine-inch spacing between plants, and 18-inch spacing between rows resulting in a plant population equivalent to 19,360 plants/acre. Each plot consisted of 26 plants/replicate (13 plants/row). The above average temperatures and rainfall experienced during trial were conducive to disease development leading to widespread losses from bacterial soft rot caused by *Erwinia carotovora* and plant death from *Phytophthora capsici*. Consequently only one harvest was conducted instead of the standard two.



Figure 1. To facilitate better decision making, UF/IFAS pepper trials culminate in an annual Pepper Field Day allowing regional growers, plant breeders, and other industry professionals to examine and compare a range of commercially available sweet bell pepper varieties grown under locally south Florida conditions.

## INTRODUCTION

Selection of the best available vegetable varieties for a region is recognized as one of the most important decisions a grower makes. Vegetable producers must grow the best locally adapted varieties to have any chance of success. Bacterial spot, caused by the bacterium, *Xanthomonas euvesicatoria*, remains one of the most serious diseases of pepper. The pathogen can spread rapidly during warm periods with wind driven rains and fruit symptoms result in reduced marketability.

South Florida growers have traditionally relied on copper applications to manage bacterial leaf spot. Since copper is a protectant, it must be applied preventatively. Copper applications are initiated at transplanting and are then applied weekly or even more frequently under conditions favorable to disease development. Upwards of 26 applications of copper may be applied growers over the course of the season. Such frequency of repeated application has led to the development of resistance and a decrease in the effectiveness of copper sprays for the control of bacterial spot.



Figure 2. Collection of harvested bell peppers from the 2015 UF/IFAS variety trial.

## MATERIALS & METHODS

The UF/IFAS Extension Service evaluated seventeen bell pepper varieties grown during the fall production season in Fort Pierce, FL. Twenty-six greenhouse grown transplants were set nine inches apart in double rows spaced 18-inches apart on top of raised beds formed on five-ft centers. The experiment consisted of a randomized complete block design with four replications on sandy soil fumigated with Telone and Chloropicrin (40:60).



Figure 3. Bell pepper leaf displaying characteristic water-soaked necrotic lesions caused by the bacterial spot pathogen, *Xanthomonas euvesicatoria*.

First harvest took place eleven weeks following transplanting. Fruit was collected and evaluated to determine bacterial spot severity, yield, size categories and postharvest quality (Table-1).

Table-1. Pepper Postharvest Quality

Variety	Lobes (number)	Length (inches)	Width (inches)	Ratio	Thickness
Abay	3.67abcd <sup>a</sup>	3.49bc	3.55	0.98abcd	0.24abc
Antebellum	3.75abc	3.67ab	3.58	1.02abc	0.24abc
Aristotle	3.17d	3.53bc	3.50	1.01abc	0.22c
Bastille	3.17d	3.29cd	3.73	0.88de	0.23c
Bayonet	3.58abcd	3.59abc	3.61	0.99abcd	0.28a
Blitz	3.33cd	3.40bcd	3.69	0.92bcde	0.25abc
Dashen	3.67abcd	3.51bc	3.58	0.98abcd	0.23c
EZ1	3.33cd	3.65ab	3.71	0.98abcd	0.28a
Gridiron	3.33cd	3.44bc	3.55	0.97abcd	0.23c
Rampart	3.92ab	3.43bc	3.66	0.93bcde	0.22c
Seedway 48	3.42bcd	3.85a	3.58	1.08a	0.23c
SPP1718	3.33cd	3.49bc	3.65	0.96bcde	0.27ab
SW001	3.75abc	3.55bc	3.51	1.01ab	0.27ab
Touchdown	3.5abcd	3.30cd	3.55	0.93bcde	0.27ab
0972	3.83abc	3.40bcd	3.80	0.90cde	0.22c
3255	4.00a	3.29cd	3.52	0.93bcde	0.24bc
9325	3.75abc	3.11d	3.63	0.86e	0.25abc
P value	0.005	0.0001	0.33	0.0007	0.0001
Significance	**	***	NS	***	***

<sup>a</sup> Within columns, means followed by different letters are significantly different according to Duncan's Multiple Range Test at 5%.

NS, \*, \*\*, \*\*\* Nonsignificant or significant at P ≤ 0.05, 0.01, or 0.001, respectively.

Table-2. Bacterial leaf spot severity and rating evaluation for 2015 Pepper Trial.

Variety	Disease severity (%)	Rating (1-5)
Abay	1.38b <sup>a</sup>	0.63b
Antebellum	0b	0b
Aristotle	0b	0b
Bastille	16.88a	3.50a
Bayonet	0b	0b
Blitz	0b	0b
Dashen	1.75b	0.63b
EZ1	0.50b	0.25b
Gridiron	0.13b	0.13b
Rampart	1.13b	0.50b
Seedway 48	0b	0b
SPP1718	0b	0b
SW001	0b	0b
Touchdown	0.63b	0.25b
0972	0b	0b
3255	0b	0b
9325	0b	0b
P value	0.0001	0.0001
Significance	***	***

<sup>a</sup> Within columns, means followed by different letters are significantly different according to Duncan's Multiple Range Test at 5%.

NS, \*, \*\*, \*\*\* Nonsignificant or significant at P ≤ 0.05, 0.01, or 0.001, respectively.

Table-3. Temperature and rainfall summary for Fort Pierce, FL during fall/winter 2015-16.<sup>a</sup>

Period	Temperature (°F)			Total rainfall (inch)
	Average	Min	Max	
October	77.6	65.0	91.0	3.62
November	76.8	57.0	86.0	4.84
December	73.8	53.0	84.0	5.49
January	62.6	35.0	84.0	11.56
Average/Total	72.7	52.5	86.3	25.51

<sup>a</sup> Weather data obtained from the National Oceanic and Atmospheric Agency (NOAA), National Weather Service Weather Station in Fort Pierce, Florida.

## RESULTS & DISCUSSION

The above average temperatures and rainfall during trial were conducive to disease development resulting in widespread plant death from *Phytophthora capsici*. Consequently only one harvest was conducted instead of the standard two. Of the cultivars evaluated, only 'Rampart' and '3255' yielded super-jumbo fruit. Their average number of super-jumbo peppers per replicate was 66 and 48 respectively. Along with 'SW001', '3255' was also an overall yield leading cultivar. The latter averaged 1,125 marketable fruit per plot and was statistically equivalent to the 1,105 produced by the former. The cultivar with the lowest marketable yield was 'Bastille' with an average of 622 per replicate. With a disease severity rating of 3.5, 'Bastille' was also the most susceptible cultivar to bacterial spot. Symptoms were seen on 17% of the 'Bastille' plant canopy whereas that on all other cultivars ranged from 1.75 – 0.0% incidence. Cultivars in this low range were statistically equivalent and received a disease severity rating of 0.63 - 0. The data generated by this trial provides useful information to aid in the selection of varieties for commercial pepper production in south Florida. However, these findings represent the results of one season's growing conditions. UF/IFAS Extension recommends conducting annual trials and encourages growers to take into account data collected from previous years due to weather and pest pressure variability.

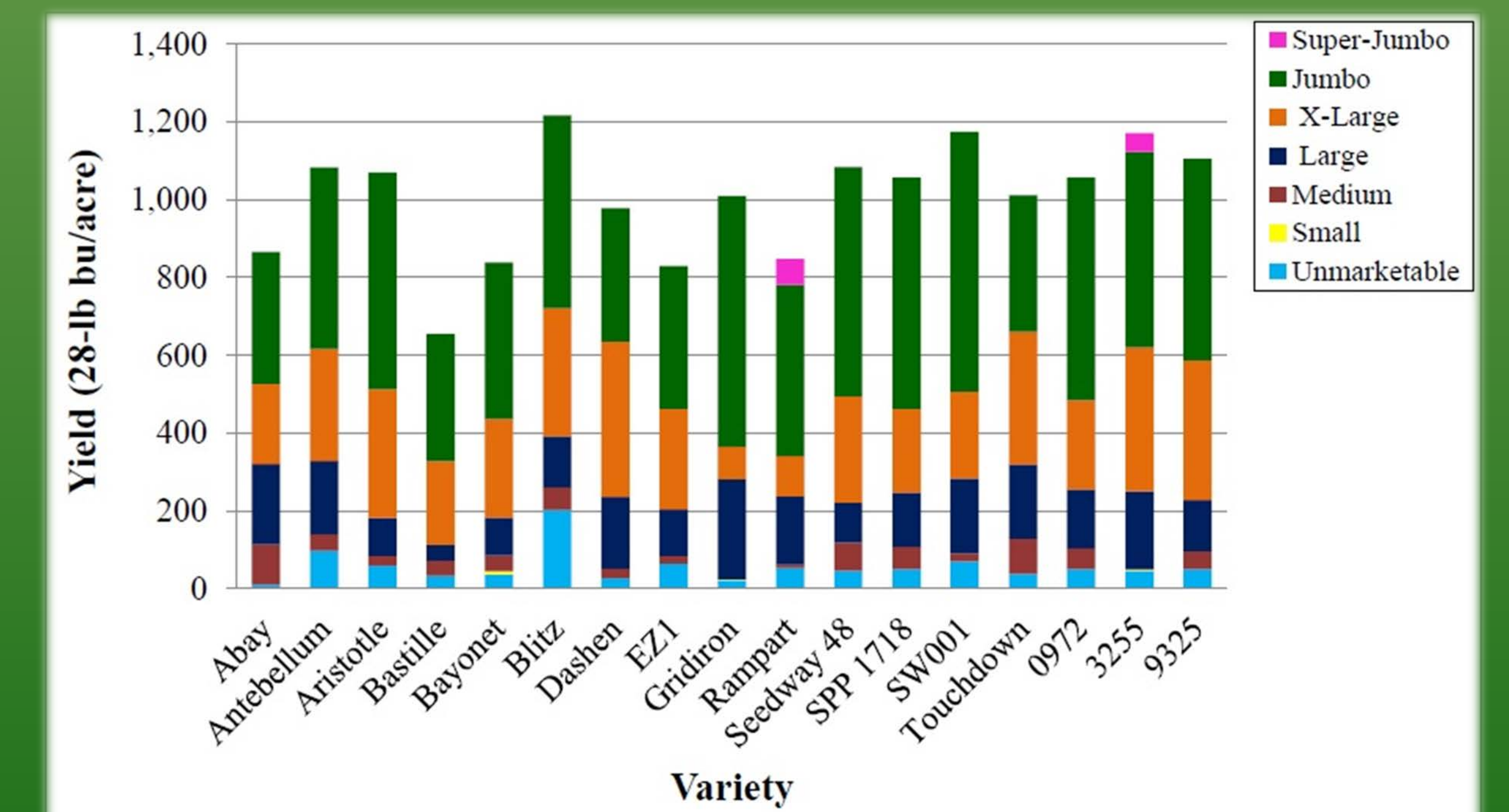


Figure 3. Total marketable and unmarketable yield, 2015 Pepper Variety Trial.