

1-12-2021

Evaluation of Bell Pepper Cultivars With and Without Resistance to Bacterial Leaf Spot and Phytophthora, West Central Minnesota

Nathan Dalman
University of Minnesota - Twin Cities, dalm0015@umn.edu

Steve Poppe
University of Minnesota - Twin Cities, poppesr@umn.edu

Follow this and additional works at: <https://docs.lib.purdue.edu/mwvtr>



Part of the [Agriculture Commons](#), and the [Horticulture Commons](#)

Recommended Citation

Dalman, Nathan and Poppe, Steve, "Evaluation of Bell Pepper Cultivars With and Without Resistance to Bacterial Leaf Spot and Phytophthora, West Central Minnesota" (2021). *Midwest Vegetable Trial Reports*. Paper 32.
<https://docs.lib.purdue.edu/mwvtr/32>

This document has been made available through Purdue e-Pubs, a service of the Purdue University Libraries. Please contact epubs@purdue.edu for additional information.

Evaluation of Bell Pepper Cultivars With and Without Resistance to Bacterial Leaf Spot and Phytophthora, West Central Minnesota, 2020

Nate Dalman, Steve Poppe, University of Minnesota, West Central Research and Outreach Center (WCROC), Morris, MN 56267 dalm0015@umn.edu, poppesr@umn.edu

Bacterial leaf spot (BLS) and Phytophthora (PHY) diseases are a common problem for Minnesota bell pepper producers and if not detected and treated early enough, these diseases can kill the plants. There are cultivars that have resistance to these particular diseases but these cultivars must maintain yields similar to traditional cultivars in order to be desired by producers and buyers. Our goal was to determine any differences in performance between cultivars with and without resistance. Yield, fruit size and number of fruit per plant were the evaluated characteristics.

Materials and Methods

The study took place on a silty clay loam at West Central Research and Outreach Center in Morris, MN. The previous crop on the soil was early summer brassicas followed by a winter rye and canola cover crop which was incorporated into the soil in mid-May, 2020. Pepper plants were sown in the greenhouse on 10 April, 2020 in 72 count plastic plug trays filled with Premier PRO-MIX BX growing media. Plants were transplanted by hand in the field into rows 2ft apart on center on 3 June, 2020. Four cultivars were used: Currier, Archimedes, Ace and Lady Bell. Currier and Archimedes both had resistance to three strains of BLS and to PHY while Ace and Lady Bell had no resistance to either disease. There were two replications due to limited space and each plot contained 25 plants. Fertilizing and insect management consisted of organic practices following standard regional practices. SUSTANE 4-6-4 granular fertilizer was applied prior to planting and Pyganic® Specialty was used to control aphids on 20 August, 2020 after noticing slight foliar damage. No bactericides or fungicides were used so that any damage from BLS or PHY would be noticeable. Irrigation was applied as needed by a drip tube system. Harvests took place six times due to an unusually long growing season in 2020. The dates were 6 and 19 August, 3 and 24 September, 8 and 15 October. After each harvest, fruit was separated into either marketable or cull and then counted and weighed. Statistical significance was calculated using a One-Way Anova test and Fisher's Least Significant Difference test.

Results and Discussion

The summer of 2020 was warmer and dryer than usual. Average monthly temps were 4.9°F above average in June, 2°F above in July, 1.9°F above in August, 1.1°F below average in September, and 7.6°F below in October. Average precipitation was 0.65" below average in June, average in July, 0.09" below in August, 1.67" below in September, and 1.04" in October.

Growing degree days were 106 days above average in June, 71 above in July, 55 above in August, and 41 below average in September. Weather data was collected on site at WCROC. All cultivars grew well in this weather and produced dense foliage. Plants had to be trellised in mid-July as plants were getting large enough that they were beginning to fall over.

All cultivars performed very well and similarly over the growing season in terms of total yield, number of fruit produced per plant, and fruit size (Table 1). No differences were found in terms of total yield or cull yield. In terms of average fruit weight, Currier and Archimedes were similar and both had significantly heavier fruit than Ace or Lady Bell and Lady Bell had significantly heavier fruit than Ace. For the average number of fruit produced per plant, Ace produced significantly more fruit than any other variety while Currier produced the least amount. When cultivars were combined by resistant or not, the resistant group produced significantly heavier fruit but less fruit. In summary, cultivars with resistance (Currier and Archimedes) yielded just as well as traditional non-resistant varieties and produced heavier fruit.

When evaluating the yield, average fruit weight, and number of fruit per plant on each date, all cultivars showed a similar trend. Marketable fruit yields peaked for all cultivars on 3 September, 2020 except Archimedes was fairly consistent over the season (Graph 1). Average fruit weights were consistent for all cultivars (Graph 2). The number of fruit produced per plant followed the same trend as the marketable yield (Graph 3). This indicates that resistant cultivars perform similarly throughout the entire growing season compared to traditional non-resistant cultivars.

Acknowledgements

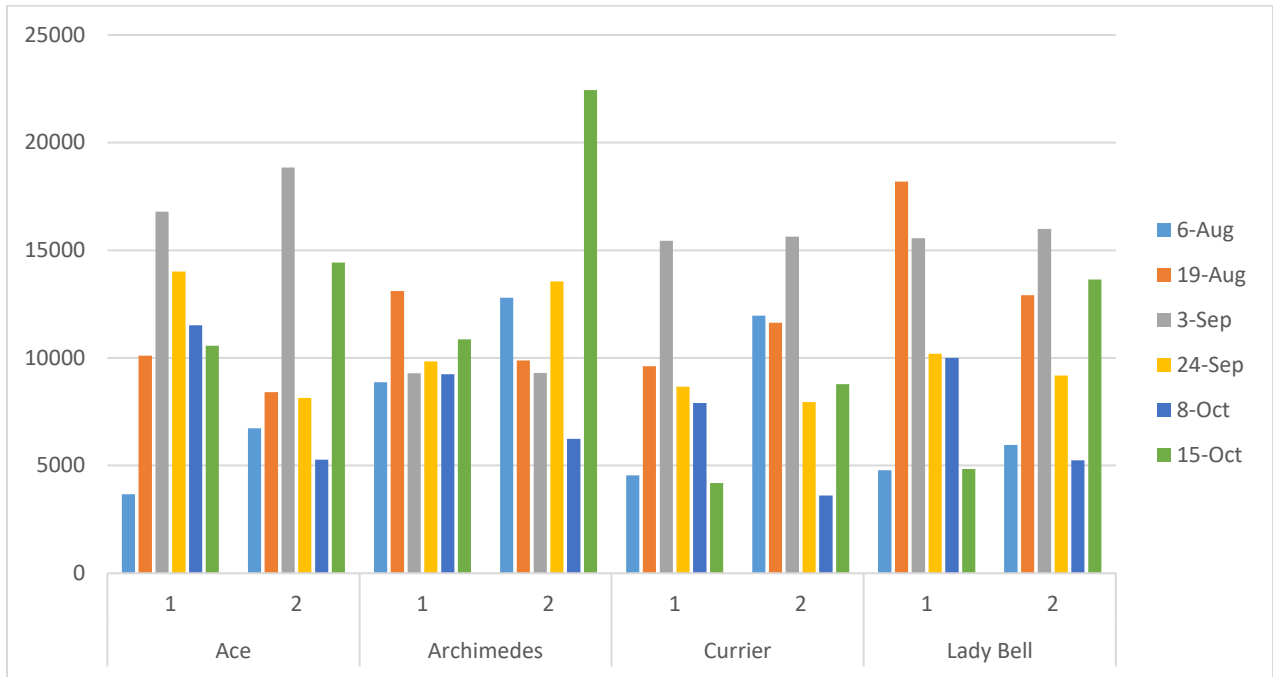
We would like to thank Nicole Peterson, Sofia Sparby and Maddie Carrington, WCROC horticulture summer student workers, for their help maintaining the experiment, Harris Seeds for the seeds, and Natalie Hoidal, University of Minnesota Extension Educator, for providing us with the idea of evaluating cultivars with these particular traits.

Table 1. Total yields, average fruit weights, average number of fruit produced per plant, and total cull yield. All weights in grams.

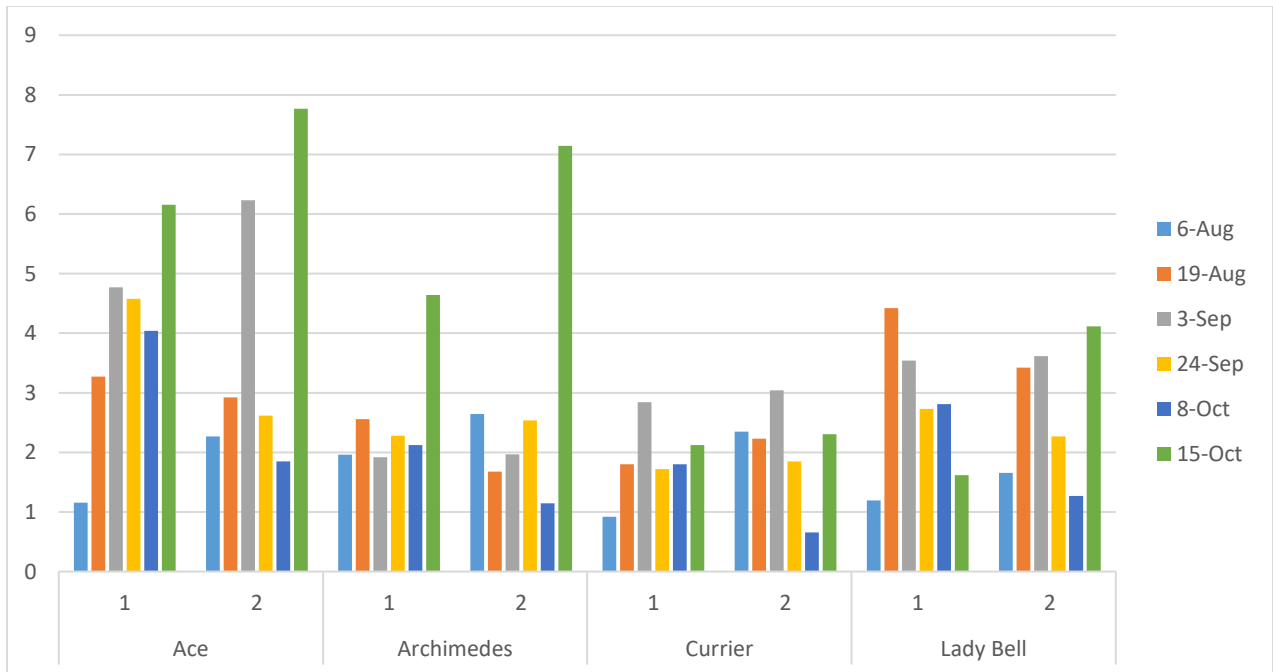
Cultivar	Resistant	Total Marketable Yield per plant	Avg Fruit Wt	Avg # Fruit per plant	Cull Yield
Currier	Yes	111551 a	183.7 a	2.0 c	1634 a
Archimedes	Yes	136124 a	172.6 a	2.7 b	681 a
Ace	No	130208 a	109.4 c	4.0 a	1725 a
Lady Bell	No	128000 a	147.8 b	2.7 b	1498 a

Numbers in the same column with the same letter are not significantly different ($P \leq .05$).

Graph 1. Marketable Yields per plant (g) on each harvest date. 1 and 2 above cultivar name is replications.



Graph 2. Average fruit weight (g) on each harvest date. 1 and 2 above cultivar name is replications.



Graph 3. Average number of fruit per plant on each harvest date. 1 and 2 above cultivar name is replications.

