

Final Report - Colored Bell Pepper High Tunnel Variety Trial 2012

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Introduction

Due to increased consumer demand and higher prices per pound (than green bells), colored bell peppers have great potential to be a profitable crop. However, because they require longer in the field they have the disadvantage of coming into the local market relatively late in the season. Due to the prolonged ripening time, most growers experience high packing losses from disease and environmental conditions during this extended maturity period. High Tunnel production of colored bells has the potential to solve both problems, thus creating a supply of high quality and high return colored bell peppers for the local marketplace when field grown green bells typically dominate.

Materials and Methods

Twelve varieties of red, four varieties of yellow, and three varieties of orange bell peppers were planted in a 96' high tunnel at the Penn State SE Agricultural Research and Extension Center on May 15, 2012. There were four 6-plant replicates of each variety. Plants were established on raised beds using the plasticulture system. There were two staggered rows on each bed and the plants were staked and spaced on 18" centers. Standard fertility and pest management practices were used.

Fruit were harvested at full color (90% or more) and graded into marketable and cull groups. Each group was then counted and weighted. Data were analyzed using the SAS program (PC version).

Results and Discussion

While PS 1819 had the greatest weight of marketable fruit followed by Red Knight, Tomcat, Chesapeake, Karisma and Hunter in the red varieties (Table1) these results were not statistically significant. Vanguard had the largest average fruit weight followed by Karisma, PS 1819, Godzilla, Islamorada and King Author. Chesapeake and Triple 4 had the smallest marketable fruit size and the highest number of marketable fruit per plant. There was no difference between the varieties in weight and number of cull fruit or total harvested weight.

The standard field varieties of red bell pepper (Hunter, PS 1819, Tomcat) performed well in the high tunnel environment again this year. Vanguard again had the largest fruit but it may be limited in usefulness for tunnel production by a somewhat muddled color and lower marketable yields.

Chesapeake and Triple 4, a greenhouse variety, performed well and had good color (although not as dark as the field varieties) but their fruit size was smaller. Variability between replicates of some varieties may have prevented measurement of significant differences in some of the traits observed even with an additional replicate for this study compared to 2011.

There were no significant differences in weight of marketable fruit, number or weight of culls and total harvested weight in the yellow varieties (Table 2). Lafayette had the largest average fruit weight and was the only variety with fruit larger than 0.50 lb. Flavorburst had the highest number of marketable fruit per plant for both yellow and any other color in the trial.

The yellow varieties tended to produce a larger number of smaller-sized marketable fruit than the red varieties. We were again impressed with the yield and appearance of Flavorburst in this color group although the color was more of an orange-yellow than a true yellow.

Milena had the highest weight and number of marketable fruit and total harvested weight in the orange peppers; there were no significant differences in the other traits measured (Table 3). Fruit size for all varieties was below 0.50 lb. While Milena had the highest yields, Delerio and Magno tended to have better-shaped fruit in this group.

Growers should also note that there are differences in the plant growth habits of these pepper varieties. Some of the field-type varieties tended to grow in a more horizontal shape over time so that by the end of the season they were becoming difficult to keep in the strings. This would include PS 1819, Red Knight and Hunter in the reds and Moonset in the yellow. Perhaps single rows would help reduce this problem vs. the double rows we used in this study. Chesapeake, on the other hand, was a very vigorous and upright growing plant in the red group and probably the best growing plant overall.

We had an observational planting in the field for these colored pepper varieties. While the data is not included here, we observed mostly lower numbers and yields of marketable fruit, higher cull numbers and weight and similar to slightly smaller average fruit size in these varieties compared to results from in the high tunnel. This observation is not unexpected and agrees with personal communications with various growers. The increase in yield and fruit quality would be most dramatic in a wet season; in 2012 the field peppers were performing similar to the high tunnel peppers until the weather became wet and yields especially began to fall-off as the weather became cooler.

Table 4 contains data from single plots of additional varieties of red, orange and yellow varieties of bell peppers (observational data). Several of these varieties performed well and may warrant further testing in grower plantings. We like especially liked Sandpiper in the yellow group but note that it matures to an orange-red color. It also had a more horizontal growing habit and plant management was more challenging later in the season.

Table 1. Number and weight of marketable fruit and culls, average marketable fruit size and total harvested weight (per plant) for 12 varieties of red bell peppers grown in a high tunnel in Lancaster County, PA in 2012.

Variety	Weight Mkt Fruit (lb)*	Number Mkt Fruit	Average Fruit Weight (lb)	Weight Culls (lb)	Number Culls	Total Harvested Weight (lb)
Chesapeake	4.02	10.03 a	0.40 f	0.62	2.10	4.65
Godzilla	3.87	6.05 bcd	0.64 abc	0.94	1.92	4.81
Hunter	3.90	6.55 bcd	0.60 bcd	0.73	1.71	4.64
Islamorada	3.63	5.70 cd	0.64 abc	1.58	3.43	5.22
Karisma	3.95	5.80 cd	0.68 ab	0.80	1.63	4.74
King Author	3.68	5.97 bcd	0.62 bcd	1.42	2.99	5.11
PS 09941819	4.40	6.63 bcd	0.67 ab	1.13	2.29	5.53
Red Knight	4.23	8.08 ab	0.52 de	0.78	1.92	5.01
Socrates	3.78	6.63 bcd	0.57 cde	1.13	2.58	4.90
Tomcat	4.10	7.37 bc	0.56 cde	0.72	1.60	4.83
Triple 4	3.87	8.20 ab	0.47 ef	0.85	2.16	4.72
Vanguard	3.35	4.63 d	0.72 a	1.33	2.46	4.68
	ns			ns	ns	ns

*Mean separation within a column is by Tukey's Studentized Range (HSD) test, ns = non-significant at the 5% level.

Table 2. Number and weight of marketable fruit and culls, average marketable fruit size and total harvested weight (per plant) for 4 varieties of yellow bell peppers grown in a high tunnel in Lancaster County, PA in 2012.

Variety	Weight Mkt Fruit (lb)*	Number Mkt Fruit	Average Fruit Weight (lb)	Weight Culls (lb)	Number Culls	Total Harvested Weight (lb)
Catriona	3.62	8.13 ab	0.44 b	0.79	2.38	4.40
Flavorburst	4.59	11.11 a	0.41 b	0.97	2.89	5.47
Lafayette	4.41	7.17 b	0.61 a	1.10	2.06	5.42
Moonset	3.40	6.92 b	0.49 b	0.97	2.63	4.36
	ns			ns	ns	ns

*Mean separation within a column is by Tukey's Studentized Range (HSD) test, ns = non-significant at the 5% level.

Table 3. Number and weight of marketable fruit and culls, average marketable fruit size and total harvested weight (per plant) for 3 varieties of orange bell peppers grown in a high tunnel in Lancaster County, PA in 2011.

Variety	Weight Mkt Fruit (lb)*	Number Mkt Fruit	Average Fruit Weight (lb)	Weight Culls (lb)	Number Culls	Total Harvested Weight (lb)
Delerio	3.12 b	7.13 b	0.44	0.83	2.79	3.95 b
Magno	3.06 b	6.92 b	0.44	0.77	2.25	3.82 b
Milena	4.14 a	9.21 a	0.45	1.14	2.83	5.28 a
			ns	ns	ns	

*Mean separation within a column is by Tukey's Studentized Range (HSD) test, ns = non-significant at the 5% level.

Table 4. Number and weight of marketable fruit and culls, average marketable fruit size and total harvested weight (per plant) for 18 varieties of red, orange and yellow bell peppers grown as single (observational) plots in a high tunnel in Lancaster County, PA in 2012.

Variety	Weight Mkt Fruit (lb)*	Number Mkt Fruit	Average Fruit Weight (lb)	Weight Culls (lb)	Number Culls	Total Harvested Weight (lb)
<u>Red</u>						
0997-935	4.41	8.63	0.51	1.37	4.00	5.78
Bayonet	3.74	7.38	0.51	1.29	3.13	5.03
Cannon	4.37	8.13	0.54	1.15	2.88	5.52
Classic	2.80	5.75	0.49	2.99	6.50	5.79
Colosso	3.80	5.88	0.65	2.12	5.75	5.91
Divo	2.85	8.38	0.34	2.07	6.75	4.92
Imperio	5.88	12.14	0.48	2.00	5.43	7.87
Maquino	5.12	10.80	0.47	2.42	7.60	7.53
Novus	2.12	5.00	0.42	2.06	5.75	4.18
Phoenix	3.85	7.63	0.50	2.06	5.63	5.91
Relampago	3.68	10.00	0.37	1.62	3.25	5.30
RPP-24226	3.60	6.38	0.56	1.69	3.88	5.29
<u>Orange</u>						
Orange Bell	2.68	7.38	0.36	2.24	6.75	4.91
Ucamari	3.84	8.13	0.47	1.58	5.00	5.42
<u>Yellow</u>						
Realtos	4.19	9.33	0.45	3.09	9.17	7.27
Sandpiper	5.29	12.63	0.42	1.21	3.25	6.50
Sirius	2.68	4.33	0.62	3.90	8.33	6.58
Vikingo	4.70	9.75	0.48	2.15	4.75	6.85