Mini- and Heirloom Sweet Pepper Variety Performance in High Tunnels, 2015

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Mini Sweet Pepper and Heirloom Pepper Performance in High Tunnels, 2015

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Specialty sweet peppers are a regular crop for some Midwest growers and may be worth considering by more. We don’t have data on direct-to-consumer sales, but weekly retail reports from the USDA Ag Marketing Service showed that Midwest grocery stores advertised mixed mini sweet peppers regularly in 2015. Terminal market reports for this category show Mexico as the primary source of product. At grocery stores, mini sweet peppers are typically sold in bags of mixed colors, commonly red, orange, or yellow, and green. The mini mixed peppers are a relatively new market category, but other specialty peppers have a history in direct sales, particularly in regions where they are a staple in traditional cuisines.

For warm-season crops like peppers, production in high tunnels permits earlier planting and extension of harvest later into the fall compared to production in the open field. In addition to the potential for increased yield per unit area, the earlier and longer harvest season may improve access to markets.

Trials on mini sweet peppers and other specialty sweet peppers in the Midwest have not recently been reported. We undertook this project to compare yield and fruit characteristics of specialty peppers grown in high tunnels. See Table 1 for varieties grown in three trials. In Trial 1, hybrid and heirloom mini colored sweet peppers were evaluated. In Trial 2 a selection of heirloom and hybrid peppers were grown. Trial 3 included two colors of a small hybrid roasting pepper.

Materials and Methods
The trials were conducted in two 48 X 30 ft. unheated greenhouses (high tunnels) with 4 ft. roll-up sidewalls and 14-foot gothic arch peak. The soil was a Tracy sandy loam. The spring 2015 soil test for high tunnel 1 and high tunnel 2 showed 2.0 and 1.7% organic matter, pH 6.9 for both, 266 and 132 ppm phosphorus (P), 213 and 106 potassium (K), 205 and 185 ppm magnesium (Mg), and 900 and 800 ppm calcium (Ca).

High tunnel 1 has been managed using organic practices since 2012. In high tunnel 1, 1,286 lb./A Nature Safe 13-0-0 and 80 lb./A K₂O from potassium magnesium sulfate (0-0-50) were applied prior to forming beds with a rototiller and vertical plow. Nature Safe 13-0-0 was assumed to release 54% of its nitrogen during the growing season, or 90 lb./A N.

In high tunnel 2, 30 lb./A N from urea and 80 lb./A K₂O from potassium chloride (0-0-60) were applied before forming beds, and an additional 51 lb. N from urea ammonium nitrate was applied through drip irrigation during the growing season.

Peppers were seeded on March 27 into 72-cell flats containing a peat-based potting mix and fertilized periodically with 3-2-2 fish emulsion (organic seedlings) or 20-10-20 (nonorganic seedlings) mixed to a concentration of 250 ppm N. Two varieties (Mini Corno di Toro Yellow and Red) were seeded later, on April 19. On May 13 seedlings were transplanted to beds on 4-foot centers, in double rows 12 inches apart, with 14 inches between plants in each row (18,669 plants per acre or 429 plants per 1,000 sq.ft.).
Trial 1 included 6 varieties of mini peppers: three hybrid and three open-pollinated “heirloom”
types. Each tunnel contained two replications in a randomized complete block design. Trial 2
included three additional open-pollinated “heirloom” types as well two of the varieties included
in Trial 1. For Trial 2, each tunnel contained one replication. For both Trial 1 and Trial 2 the
experimental unit was a 7-foot length of bed with 12 plants of one variety. Trial 3 included the
two Mini Corno di Toro varieties that were transplanted on May 19 in one plot in each tunnel,
with six plants of each variety per plot.

Irrigation was provided through two surface drip lines on each bed. When 6-inch tensiometer
readings exceeded 20 kPa, approximately 90 gallons of water were applied to the 504 sq. ft. of
peppers in each tunnel (equivalent to 0.29 inches of rain).

Plants were supported with string attached to stakes placed along the edges of the beds and/or
rows. Plants rested on the string but were not tied to it.

Weeds were controlled by hoeing and hand-weeding. Insect pests were observed but no controls
were applied.

Harvests were conducted July 28, August 11, and September 4. On each date, peppers from the
center eight plants of each plot were harvested. At the first two harvests, only peppers with at
least 60% or the surface showing mature color were harvested. At the final harvest, all fruit
larger than about 1 inch were harvested. Fruit were graded into marketable, cull, and at the final
harvest, mature green and immature green. Weight and number of fruit in each category were
recorded. At one harvest, the length and diameter of 10 marketable fruit and the wall thickness of
five fruit were recorded. Wall thickness was measured by slicing off the stem end of the pepper
and using a caliper to measure wall thickness. Typical pepper shape (Figure 1) and color were
recorded.

Yield and fruit number per plant harvested were calculated and used in analysis. Because a few
plants had died prior to harvest, yield per plant seemed a fairer comparison of the relative yield
of the varieties. For each plot, the percent of the total fruit number that was marketable, cull,
mature green, or immature was calculated, and the percent by weight of total yield that was
harvested on each date was calculated. Quantitative data with equal variance across treatments
($P>.05$) were analyzed using ANOVA followed by mean separation using Fisher’s protected
least significant difference at $P \leq 0.05$. For Trial 1, high tunnel was considered a fixed effect. For
Trial 2, high tunnel was considered a random effect. ANOVA was not performed for Trial 3.

**Results and Discussion**

**Trial 1. Mini Colored Sweet Peppers**

The six varieties of mini sweet peppers differed significantly in total, marketable, and cull yield,
as well as in percent marketable, cull, mature green, and immature green (Table 2). The total
yield reported represents the yield potential if harvest were continued later in the fall and all fruit
were of marketable quality.

Lunchbox Orange and Lunchbox Yellow had the highest marketable and total yield in pounds
per plant. Marketable yield of Mini Red Bell was not significantly less. Lunchbox Red had total
and marketable yield (lb./plant) similar to Mini Red Bell, but significantly less than Lunchbox
Orange and Yellow. Mini Yellow Bell and Mini Chocolate Bell had lower marketable and total
yield (lb./plant) than Lunchbox Orange, Lunchbox Red, or Mini Red Bell.
Three to seven percent of all fruit were culled. Common reasons for cull included decay, very small or stubby fruit, and insect or rodent feeding. Lunchbox Yellow had the greatest weight, number, and percent cull, although only the weight per plant was significantly more than other varieties.

Lunchbox Orange had the highest percentage of mature green fruit, 22%, followed by Lunchbox Yellow, 15%. The other varieties had similar percentages of mature green fruit, 6.3 to 8%. Mini Chocolate had the highest percentage of immature fruit, 19%. The other varieties had between 7.8 and 10.3% immature fruit.

Average fruit size varied among the varieties (Table 3, Figure 1). Lunchbox Orange and Lunchbox Yellow both averaged about 1.1 oz per fruit and 4 to 4.25 cm (1.6 to 1.7 in) wide, but Lunchbox Orange was significantly longer (8.08 cm vs 7.39 cm, 3.2 vs 2.9 in), and Lunchbox Yellow had thicker walls (4.94 mm vs 4.44 mm). Lunchbox Red, in comparison, was less than half the weight (0.43 oz) of these two, and only two thirds to three quarters in length, width, and wall thickness. Mini Chocolate Bell was similar in weight and wall thickness to Lunchbox Yellow and Orange, but with a blocky shape was significantly shorter and wider. Mini Red Bell was about three-quarters the size of Mini Chocolate. Mini Yellow Bell weighed less and had thinner walls than Mini Red Bell, and slightly (though not significantly) smaller dimensions. Average fruit size declined as the season progressed.

The varieties differed in harvest timing (Table 3). For Mini Chocolate Bell, nearly 16% of yield was harvested in July, and only 33% was harvested in September. Lunchbox Orange and Yellow had 80% harvested in September, reflecting the greater percentage of mature green fruit harvested at that time.

Tables 2 and 3 also show some differences between the high tunnels. High tunnel 1 had a higher percentage of cull fruit averaged over all varieties, but for some varieties there was no difference (Lunchbox Red, Mini Red Bell, and Mini Yellow Bell), and for Lunchbox Orange, high tunnel 2 had a higher percentage of cull fruit. Fruit in high tunnel 2 were longer by 0.35 cm (0.14 inch). Mini Chocolate Bell and Mini Red Bell had thicker walls in high tunnel 1. The percent of fruit harvested for each variety in July, August, and September varied in the two tunnels. However, the overall tunnel effect and the effect of the tunnel on differences between varieties were small compared to the overall differences between varieties. In general, the varieties performed similarly in the two tunnels.

**Trial 2. Specialty Peppers**

The heirloom peppers Cherneva Chushka, Kalman’s Hungarian, and Sheepnose Pimento produced fewer and larger fruit than the Lunchbox Red and Mini Yellow Bell peppers, but significant differences in yield (lb/plant) were not detected (Tables 4 and 5, Figure 1).

Almost 15% of the Sheepnose Pimento harvest occurred on the first harvest date, significantly more than for other varieties, which all had less than 3% harvested at that time. Cherneva Chushka and Lunchbox Red had the greatest percentage harvested in September, close to 85%. Kalman’s Hungarian had the heaviest (4.6 oz) and widest (8.4 cm, 3.3 in) fruit with the thickest walls (6.7 mm), but it was quite squat (4.9 cm, 1.9 in). It was noted to have good flavor. Compared to Kalman’s Hungarian, Sheepnose Pimento was a little lighter, longer (but not significantly), narrower, and had thinner walls. Cherneva Chushka was the longest at 11 cm (4.3 in), 5 cm (2 in) wide, and had intermediate wall thickness and fruit weight. The skin of Cherneva
Chushka was noted to be tough, not unexpected for a roasting pepper. These three varieties were overall larger than Lunchbox Red and Mini Yellow Bell.

Results for Mini Corno di Toro Red and Yellow are also presented in Tables 4 and 5 and Figure 1, but because they were seeded later than the other varieties and not harvested until September, they were not included in the statistical analysis. Yield in pounds per plant was about 50% to 100% higher than the other specialty peppers, and fruit were heavier (2.7-3.1 oz) and longer (12.8-13.0 cm, 4.0-5.1 in). The red variety tended to have slightly larger and heavier fruit.

Pest and Disease Observations

A few plants (3%) wilted and died after establishment and before harvest. Inspection showed that the base of the stem was broken. Physical damage, possibly from wind, seemed a likely cause. Aphids were observed in mid-June; parasitized aphid “mummies” were noted about three weeks later. By the final harvest in September aphid populations were high enough to result in honeydew and sooty mold growth on the pepper fruit. No controls were applied, but in a commercial situation, management would be necessary to maintain fruit quality.

European corn borers infested peppers by burrowing under the “cap” or calyx and into the fruit. Peppers with borers were not culled unless feeding was visible or the fruit had proceeded to decay, but in a commercial situation, peppers with any borer injury or borers present would not be marketable. In a commercial situation, monitoring European corn borer flights, scouting for egg masses, scouting for damage to fruit, and taking steps to prevent infestation would be important. Rodents also caused damage to fruit, especially at the end of the season. Thirteen-lined ground squirrels were observed in the area.

We did not observe significant disease on leaves or fruit. A few fruit were culled due to a brown discoloration of unknown origin that was particularly noticeable on yellow and orange fruit.

Economic Considerations

Estimating the value of a crop is difficult but a few simple calculations may be instructive. Assuming a direct-market price similar to the average advertised grocery store retail price for mixed mini sweet peppers in the Midwest from July-September 2015, $2.70/lb. (USDA AMS, 2015), and the average yield of 2 lb/plant we observed in Trial 1, we could estimate sales of $2.32 per sq. ft. If we consider just the highest yielding Lunchbox types, and use 85% of the total fruit yield (equivalent to the marketable plus mature green fruit), or 2.47 lb/plant, sales would be $2.86 per sq. ft. These values for gross sales are below published estimates for gross sales of bell peppers ($3.20 per sq. ft.) and slicing tomatoes ($7.25 per sq. ft.) from high tunnels, based on Iowa farm data (Iowa State University 2012).

These estimates suggest that either yield and/or price of the mini sweet peppers would have to be substantially higher in order for them to provide a monetary advantage over a crop of tomatoes or even bell peppers. It may be that higher yields could be achieved with earlier seeding, better pest management, a longer harvest period, and more production experience. Higher prices might also be possible. In San Francisco, pints of organic mixed mini peppers sold at terminal markets for around $6.80 per pound in 2015 (USDA AMS, 2015), so higher prices might be achievable in some Midwest markets also.

In addition to consideration of yield and prices, it is important to consider the cost of production and net income from a crop, as well as how the crop fits into the overall marketing and production plan for a farm.
Summary and Conclusions
This trial demonstrated specialty pepper production using organic or conventional practices in high tunnels. Based on results from this year’s trial, Lunchbox Orange and Lunchbox Yellow look the most promising of those trialed for a small-fruited pepper to be marketed for eating fresh and whole as a snack or side. Their similarity in fruit size and maturity would probably make them easy to market as a mix. Lunchbox Red performed well on its own, but the noticeably smaller size would make a less uniform mix if combined with the other two Lunchbox varieties.

The Mini Yellow Bell and Mini Red Bell produced small attractive fruit, but had a lot of seeds for their size, and casual taste tests indicated unremarkable flavor, so they do not appear promising for a snacking pepper.

The Chocolate Mini Bell had an early harvest compared to others, which could provide a desirable jump to the marketing season. Although the blocky shape of the Chocolate Mini Bell differs from the narrow elongated Lunchbox Orange and Yellow, the similar weight and wall thickness may make it suitable for selling as a mix with them.

Cherneva Chushka, Sheepnose Pimento, and Kalman’s Hungarian all appear to have potential, but one would need more information about particular culinary uses and market demand for these types in order to bring out that potential. The Mini Corno di Toro Yellow and Red also look worthy of further trial.

Continued trials of specialty peppers at universities and on active farms will be valuable to identify types, varieties, and production and marketing systems that are likely to be economically viable.

Acknowledgments
J. Leuck and Pinney-Purdue Agricultural Center staff managed field operations. C. Brown, A. Leman, J. Malecki, and J. Smiddy assisted with fieldwork and data. Johnny’s Selected Seeds donated seed.

Literature Cited

Table 1. Pepper varieties included in Trials 1, 2, and 3, and notes from seed suppliers.

<table>
<thead>
<tr>
<th>Trial</th>
<th>Variety</th>
<th>Seed Source</th>
<th>Days to Maturity</th>
<th>Notes from Seed Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lunchbox Orange</td>
<td>JSS</td>
<td>60/80</td>
<td>Mini-sized peppers are delicious sautéed, as an addition to salads and, perfect for a healthy snack. Tall, strong plants that yield well for snack-type peppers.</td>
</tr>
<tr>
<td>1,2</td>
<td>Lunchbox Red</td>
<td>JSS</td>
<td>55/75</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Lunchbox Yellow</td>
<td>JSS</td>
<td>63/83</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Mini Bed Bell</td>
<td>SSE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,2</td>
<td>Mini Yellow Bell</td>
<td>SSE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Chervena Chushka</td>
<td>SSE</td>
<td></td>
<td>Bulgarian pepper traditionally used for roasting. Red fruit to 6 inches long. Sturdy plants. Works for fresh eating, roasting, and salsa.</td>
</tr>
<tr>
<td>2</td>
<td>Kalman’s Hungarian</td>
<td>SSE</td>
<td></td>
<td>Flavorful, flattened peppers that have crisp, sweet flesh. Tomato-shaped, ribbed fruit. Plants to 2 ft. tall, require staking. Works for fresh eating, roasting, and salsa.</td>
</tr>
<tr>
<td>2</td>
<td>Sheepnose Pimento</td>
<td>SSE</td>
<td></td>
<td>Very meaty pepper good for canning. Stores well in refrigeration. Flattened, tomato-type pepper. Works for fresh eating, roasting, salsa, canning.</td>
</tr>
<tr>
<td>3</td>
<td>Mini Corno di Toro Red</td>
<td>JSS</td>
<td>60/80</td>
<td>Very early and sweet. 5 inches long. Perfect for grilling and roasting. Called ‘Cornito Rosso’ (red) and ‘Cornito Giallo’ (yellow) in 2016 catalog.</td>
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<tr>
<td>3</td>
<td>Mini Corno di Toro Yellow</td>
<td>JSS</td>
<td>55/75</td>
<td></td>
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Table 2. Yield and fruit size of small-fruited colored peppers in high tunnels, Wanatah, Indiana, 2015.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Total Fruit</th>
<th>Marketable Fruit</th>
<th>Cull Fruit</th>
<th>Marketable</th>
<th>Cull</th>
<th>Mat. Green</th>
<th>Immature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lb/plant</td>
<td>no/plant</td>
<td>lb/plant</td>
<td>no/plant</td>
<td>% by no</td>
<td>% by no</td>
<td>% by no</td>
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<tr>
<td>High Tunnel</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Lunchbox Orange</td>
<td>48.5 cd</td>
<td>2.98 a</td>
<td>32.2 c</td>
<td>2.24 a</td>
<td>1.39 c</td>
<td>0.09 bc</td>
<td>66.1 b</td>
</tr>
<tr>
<td>Lunchbox Red</td>
<td>84.8 a</td>
<td>2.15 bc</td>
<td>69.7 a</td>
<td>1.90 bc</td>
<td>2.08 bc</td>
<td>0.05 c</td>
<td>82.3 a</td>
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<td>Lunchbox Yellow</td>
<td>44.1 d</td>
<td>2.82 bc</td>
<td>30.5 c</td>
<td>2.14 a</td>
<td>3.09 a</td>
<td>0.23 a</td>
<td>69.2 b</td>
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<tr>
<td>Mini Chocolate</td>
<td>33.4 e</td>
<td>2.06 c</td>
<td>22.3 d</td>
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<td>2.09 bc</td>
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<td>Mini Red</td>
<td>57.3 bc</td>
<td>2.38 b</td>
<td>46.7 b</td>
<td>2.12 ab</td>
<td>1.97 bc</td>
<td>0.05 c</td>
<td>82.4 a</td>
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<td>Mini Yellow</td>
<td>65.7 b</td>
<td>2.02 c</td>
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<td>0.05 c</td>
<td>79.5 a</td>
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<tr>
<td>1 Lunchbox Orange</td>
<td>51.7</td>
<td>2.97 a</td>
<td>34.8</td>
<td>2.31</td>
<td>0.72 f</td>
<td>0.04 d</td>
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<td>1 Lunchbox Red</td>
<td>87.8</td>
<td>2.32 bc</td>
<td>73.8</td>
<td>2.08</td>
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<td>48.0</td>
<td>2.99 a</td>
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<td>2 Lunchbox Red</td>
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<td>1.88 cde</td>
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<td>25.2</td>
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<td>0.69 ef</td>
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<td>83.4</td>
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<td>2 Mini Yellow</td>
<td>56.9</td>
<td>1.73 cd</td>
<td>46.9</td>
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<td>2.06 cd</td>
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Table 2 (continued)

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<th>Source</th>
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<th>Cull Fruit</th>
<th>Marketable</th>
<th>Cull</th>
<th>Mat. Green</th>
<th>Immature</th>
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<td>lb/plant</td>
<td>no/plant</td>
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<td>% by no</td>
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<td>0.1085</td>
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<tr>
<td>VAR</td>
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<td>0.0001*</td>
<td>&lt;.0001*</td>
<td>0.0007*</td>
<td>0.0231*</td>
<td>0.0003*</td>
<td>0.0006*</td>
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<td>0.0672</td>
<td>0.0025*</td>
<td>0.0021*</td>
<td>0.3818</td>
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1Harvest area per plot 4 ft. X 4.7 ft. = 18.7 sq.ft; 8 plants transplanted.
Marketable fruit at least 60% ripe color. Mature green and immature fruit were harvested on 9/4 only. Total fruit includes all fruit harvested.
Means of the same type within a column followed by the same letter do not differ significantly at P<.05 according to Fisher's protected LSD.
Table 3. Fruit size and harvest timing of small-fruited colored peppers in high tunnels, Wanatah, Indiana, 20151.

<table>
<thead>
<tr>
<th>Ave. Mkt. Fruit Wt.</th>
<th>Length</th>
<th>Width</th>
<th>Wall Thickness</th>
<th>Percent of Total Harvest (by wt)</th>
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<tbody>
<tr>
<td>oz</td>
<td>cm</td>
<td>cm</td>
<td>mm</td>
<td>7/28</td>
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<td>High Tunnel</td>
<td></td>
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<tr>
<td>1</td>
<td>0.85</td>
<td>5.16 b</td>
<td>4.03</td>
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<td>0.85</td>
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<td>Variety</td>
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<td>Lunchbox Orange</td>
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<td>8.08 a</td>
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</tr>
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<td>4.74 a</td>
<td>4.83 ab</td>
</tr>
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<td>3.84 bc</td>
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<td>3.14 e</td>
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<td>High Tunnel and Variety</td>
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<td></td>
</tr>
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<td>8.09</td>
<td>4.00</td>
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<td>4.86 abc</td>
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<tr>
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<td>3.77</td>
<td>5.26</td>
<td>5.31 a</td>
</tr>
<tr>
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<td>3.92</td>
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</tr>
<tr>
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<td>5.49</td>
<td>3.02</td>
<td>3.04 d</td>
</tr>
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<td>2 Lunchbox Yellow</td>
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<td>7.67</td>
<td>4.16</td>
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<td>0.74</td>
<td>3.85</td>
<td>3.77</td>
<td>3.63 d</td>
</tr>
<tr>
<td>2 Mini Yellow</td>
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<td>3.15</td>
<td>3.62</td>
<td>3.54 d</td>
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Continued on next page
Table 3 (continued)

<table>
<thead>
<tr>
<th>Ave. Mkt. Fruit Wt.</th>
<th>Length</th>
<th>Width</th>
<th>Wall Thickness</th>
<th>Percent of Total Harvest (by wt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>oz</td>
<td>cm</td>
<td>cm</td>
<td>mm</td>
<td>7/28</td>
</tr>
<tr>
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</table>

Analysis of Variance

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<th>HT</th>
<th>VAR</th>
<th>HTXVAR</th>
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<td>0.0001*</td>
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<td>&lt;.0001*</td>
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<td>&lt;.0001*</td>
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<td>0.5726</td>
<td>&lt;.0001*</td>
<td>0.0254*</td>
</tr>
</tbody>
</table>

1Means of the same type within a column followed by the same letter do not differ significantly at P<.05 according to Fisher's protected LSD.

Table 4. Yield of seven specialty colored peppers in high tunnels, Wanatah, Indiana, 20151.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Total Fruit</th>
<th>Marketable Fruit</th>
<th>Cull Fruit</th>
<th>Marketable</th>
<th>Cull</th>
<th>Mature Green</th>
<th>Immature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>no/plant</td>
<td>lb/plant</td>
<td>no/plant</td>
<td>lb/plant</td>
<td>% by no</td>
<td>% by no</td>
<td>% by no</td>
</tr>
<tr>
<td>Cherneva Chushka</td>
<td>18.0 b</td>
<td>1.95</td>
<td>14.8 c</td>
<td>1.70</td>
<td>1.24</td>
<td>0.12</td>
<td>82.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6.7</td>
<td>4.5</td>
<td>6.7</td>
</tr>
<tr>
<td>Kalman's Hungarian</td>
<td>10.2 b</td>
<td>2.51</td>
<td>6.9 c</td>
<td>1.99</td>
<td>1.31</td>
<td>0.35</td>
<td>68.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13.5</td>
<td>3.8</td>
<td>14.1</td>
</tr>
<tr>
<td>Lunchbox Red</td>
<td>80.2 a</td>
<td>2.02</td>
<td>59.3 a</td>
<td>1.62</td>
<td>5.00</td>
<td>0.12</td>
<td>74.0</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td>6.2</td>
<td>9.6</td>
<td>10.3</td>
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<tr>
<td>Mini Yellow Bell</td>
<td>59.2 a</td>
<td>1.58</td>
<td>41.6 b</td>
<td>1.30</td>
<td>7.50</td>
<td>0.11</td>
<td>72.3</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td>11.1</td>
<td>4.5</td>
<td>12.0</td>
</tr>
<tr>
<td>Sheepnose Pimento</td>
<td>12.8 b</td>
<td>2.40</td>
<td>8.8 c</td>
<td>1.77</td>
<td>1.50</td>
<td>0.29</td>
<td>69.6</td>
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<td></td>
<td></td>
<td></td>
<td>11.3</td>
<td>11.4</td>
<td>7.7</td>
</tr>
<tr>
<td>Mini Corno di Toro</td>
<td>24.3</td>
<td>4.08</td>
<td>14.5</td>
<td>2.82</td>
<td>0.63</td>
<td>0.13</td>
<td>59.6</td>
</tr>
<tr>
<td>Red</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.66</td>
<td>20.6</td>
<td>17.1</td>
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<tr>
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<td>23.5</td>
<td>3.47</td>
<td>15.4</td>
<td>2.59</td>
<td>0.46</td>
<td>0.04</td>
<td>64.9</td>
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<tr>
<td>Yellow</td>
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<td></td>
<td>1.89</td>
<td>17.5</td>
<td>15.7</td>
</tr>
</tbody>
</table>

1Harvest area per plot 4 ft. X 4.7 ft. = 18.7 sq.ft; 8 plants transplanted; Corno di Toto varieties were 9.33 sq. ft. and 4 plants.
Marketable fruit at least 60% ripe color. Mature green and immature fruit were harvested on 9/4 only. Total fruit includes all fruit harvested.
Means within a column followed by the same letter or no letter do not differ significantly at P<.05 according to Fisher's protected LSD.
Corno di Toro varieties were not included in ANOVA because they were planted at a later date.
Table 5. Fruit size and harvest timing of seven specialty colored peppers in high tunnels, Wanatah, Indiana, 2015\(^1\).

<table>
<thead>
<tr>
<th>Variety</th>
<th>Mkt. Fruit Wt.</th>
<th>Fruit Length</th>
<th>Fruit Width</th>
<th>Wall Thickness</th>
<th>Percent of Total Harvest (by wt)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>oz/fruit</td>
<td>cm</td>
<td>cm</td>
<td>mm</td>
<td>7/28</td>
</tr>
<tr>
<td>Cherneva Chushka</td>
<td>1.84 c</td>
<td>11.0 a</td>
<td>5.0 c</td>
<td>4.36 bc</td>
<td>0.0 b</td>
</tr>
<tr>
<td>Kalman's Hungarian</td>
<td>4.63 a</td>
<td>4.9 bc</td>
<td>8.4 a</td>
<td>6.69 a</td>
<td>2.1 b</td>
</tr>
<tr>
<td>Lunchbox Red</td>
<td>0.44 d</td>
<td>5.9 c</td>
<td>3.1 e</td>
<td>2.69 d</td>
<td>1.1 b</td>
</tr>
<tr>
<td>Mini Yellow Bell</td>
<td>0.50 d</td>
<td>3.5 d</td>
<td>3.7 d</td>
<td>3.23 cd</td>
<td>2.7 b</td>
</tr>
<tr>
<td>Sheepnose Pimento</td>
<td>3.24 b</td>
<td>5.6 b</td>
<td>7.3 b</td>
<td>5.18 b</td>
<td>14.8 a</td>
</tr>
<tr>
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<td>&lt;.0001*</td>
<td>0.0045*</td>
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<td>5.0</td>
<td>—</td>
<td>0</td>
</tr>
<tr>
<td>Mini Corno di Toro Yellow</td>
<td>2.70</td>
<td>12.8</td>
<td>4.9</td>
<td>—</td>
<td>0</td>
</tr>
</tbody>
</table>

\(^1\)Means within a column followed by the same letter do not differ significantly at P<.05 according to Fisher's protected LSD. Corno di Toro varieties were not included in ANOVA because they were planted at a later date.
Figure 1. Fruit of 11 sweet pepper varieties with notes on shape and color. Peppers in photographs were harvested in September.