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G.A. Pabodha Galgamuwa
Kansas State University

Charles J. Barden
Kansas State University

Ward Upham
Kansas State University

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Hot Pepper Cultivar Evaluation Using Extension Master Gardeners

G.A. Pabodha Galgamuwa, Charles J. Barden, and Ward Upham
Kansas State University Department of Horticulture, Forestry and Recreation Resources

Introduction

Replicated field trials are the preferred method of vegetable production performance evaluation. However, they are very labor intensive and require extensive contiguous areas for replicated plots. Every year new vegetable cultivars are introduced, and there is intense interest from commercial growers and home gardeners to learn if the new cultivars will perform better than the current standards, in their particular region.

Since data from well-replicated field trials are not usually available locally, a multilocal field trial was initiated with assistance from Master Gardener groups, based on Citizen Science principles (Barden et al., 2014). Citizen Science is a participatory system of conducting research involving non-scientists in the collection of research data, and has been used in other vegetable production studies (Gittleman et al 2012). Most states have a cadre of Extension Master Gardeners, and with the explosion of interest in community gardens and local food production, there is increasing interest in local vegetable performance trials.

Materials and Methods

Each year Kansas State University Research and Extension Master Gardener (MG) groups receive flats of selected tomato and pepper cultivars for planting in demonstration or community gardens. Information on the study methodology is provided to each group. In exchange for these “free” plants, the MG groups are required to collect various types of data throughout the season, entering their observations on standardized forms. Participants are instructed to establish and manage all the plants using uniform spacing and cultural practices at each site.

Data recorded include information about the garden plot such as soil texture, tillage depth, fertilization, irrigation, transplanting dates, plant spacing, and care. Observational data is recorded at least three times during the season. The new cultivars are compared to a common standard in terms of vigor, disease resistance, relative yield, uniformity, and blemishes (Table 1).

A simple three-point scale is used, with a rating of 1 for poor performance, 2 for fair, and 3 for good performance. If a new cultivar earns an identical numerical rating to the check, to further compare the two cultivars, a plus (+) is added to denote that the new cultivar is better than the check, a zero (0) indicates they are equivalent, and a minus (-) for new cultivars that are judged inferior to the check. A similar relative comparison system is used in the All-America Selections^R vegetable trials (Lawson 2013). A column is provided for comments.

Each planting location is treated as one replication, with observational data being collected at six to eight sites per year. Yield data are also recorded at two to three sites each year. Observations from these multiple trial sites are then used to evaluate both current recommended cultivars and potential new cultivars.

Table 1. Example rating sheet.

Please rate all the varieties on a 1=poor, 2=fair, and 3=good scale.

Please also compare the test varieties with the “check” and rate them better (+), worse (-) or same (0).

Thus, the boxes of the test varieties will include two entries, i.e. 2+.

Plant Characteristics				Fruit Characteristics			
Variety	# Plants	Vigor	Disease Resistance	Relative Yield	Uniformity	Blemishes	Comments
Anaheim 118 — check	6	2	3	2	3	2	Sunscald
Suharo	6	3 +	3 0	2 +	2 -	3 +	
Biggie Chili	6	3 +	3 -	3 +	3 -	2 -	
Cajun Belle	6	2 +	3 0	2 -	3 0	3 +	
Chili G76	6	2 0	3 0	2 +	2 -	2 0	Blossom End Rot

The best performing cultivars in a particular year are retained in the trial for next year to confirm, while poorly performing cultivars are usually dropped and replaced by a new cultivar for next season. Reported here are the summary of the hot pepper trials conducted from 2008-2013. The primary goal of this study was to identify the best performing hot pepper cultivars to help update the list of K-State recommended vegetable varieties.

All the plants were started from seeds direct-sown into plastic 6-packs, which were raised in the greenhouse. Each group gets a flat containing six plants of each cultivar tested that particular year. The check cultivars have varied from year to year, depending on available seed. New Mexico Improved (four years) and Anaheim 118 (twice) have been used for chili peppers, while Agriset 4108 has been used for all five years as the check cultivar for jalapeno peppers.

Results

The cultivars evaluated in the trials are listed in Table 2 (chili peppers) and Table 3 (jalapeno peppers). A total of 19 chili pepper and 15 jalapeno pepper cultivars have been assessed with this system. The mean ratings for yield, uniformity, and resistance to blemishes are shown in Figures 1 to 4 for hot pepper cultivars assessed in 2013 and 2012. The n values shown are the number of plants of each cultivar that were evaluated.

From Figure 1, it can be seen that in 2013 Stoked has the highest rating for yield, the second highest for resistance to cracking, and the third highest for uniformity. Both Suharo and Charger rated higher than the check Anaheim 118 for relative yield. Numex Big Jim, Rio De Oro and G-76 had comparable rating for yield and uniformity. However, Numex Big Jim had the lowest rating to resistance to blemishes. In 2012 (Figure 2), Mariachi obtained the highest rating for relative yield, the second highest for uniformity, and comparable ratings with Biggie Chili and Numex Big Jim for blemishes. Numex Big Jim along with Cajun Belle was rated the lowest for relative yield, while Cajun Belle rated the lowest for other two parameters as well.

Table 2. Chili pepper cultivars evaluated.

2008	2009	2010	2011	2012	2013
New Mexico Improved — Check	New Mexico Improved — Check	New Mexico Improved — Check	New Mexico Improved — Check	Anaheim — Check	Anaheim — Check
Mosco	Mosco	Mosco	Biggie Chile	Biggie Chile	Charger
Mariachi	Mariachi	Red Rocket	Mariachi	Mariachi	Stoked
Ancho Masivo	Ancho Masivo	G 76	G 76	Cajun Belle	G 76
	Ancho Capulin	Ancho Capulin	Astry	Suharo	Suharo
	Golden Heat	El Hombre	Tiburon	Numex Big Jim	Numex Big Jim
				Tiburon	Rio DeOro

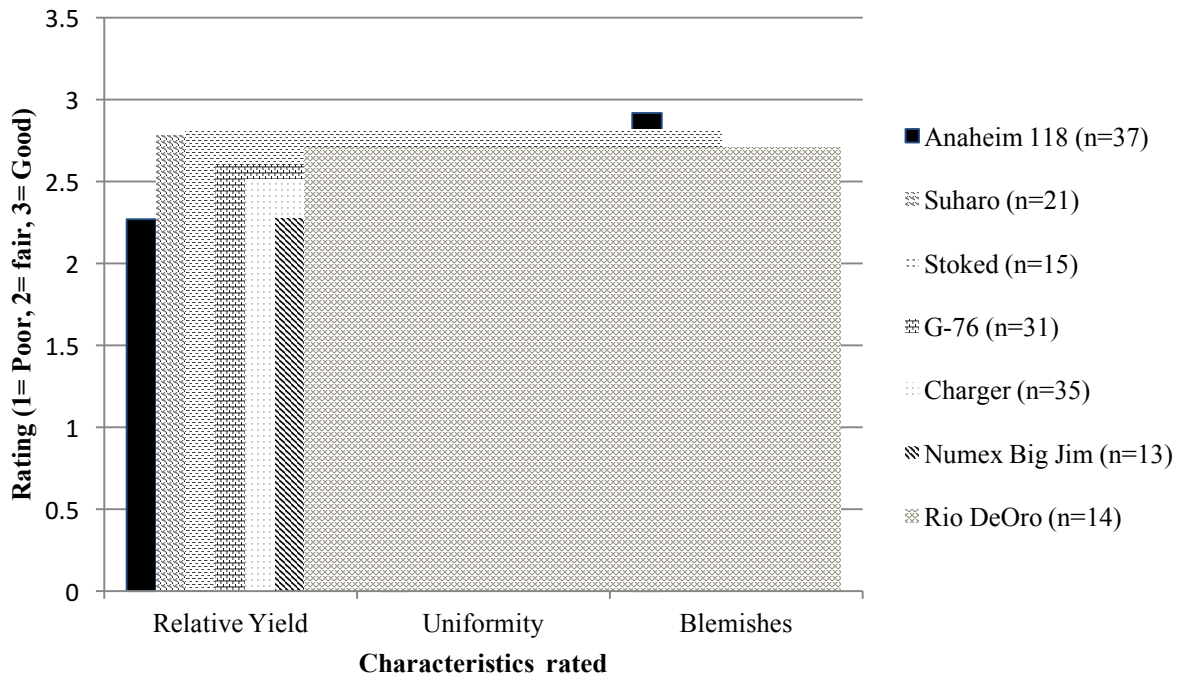


Figure 1. Chili pepper cultivar ratings for 2013.

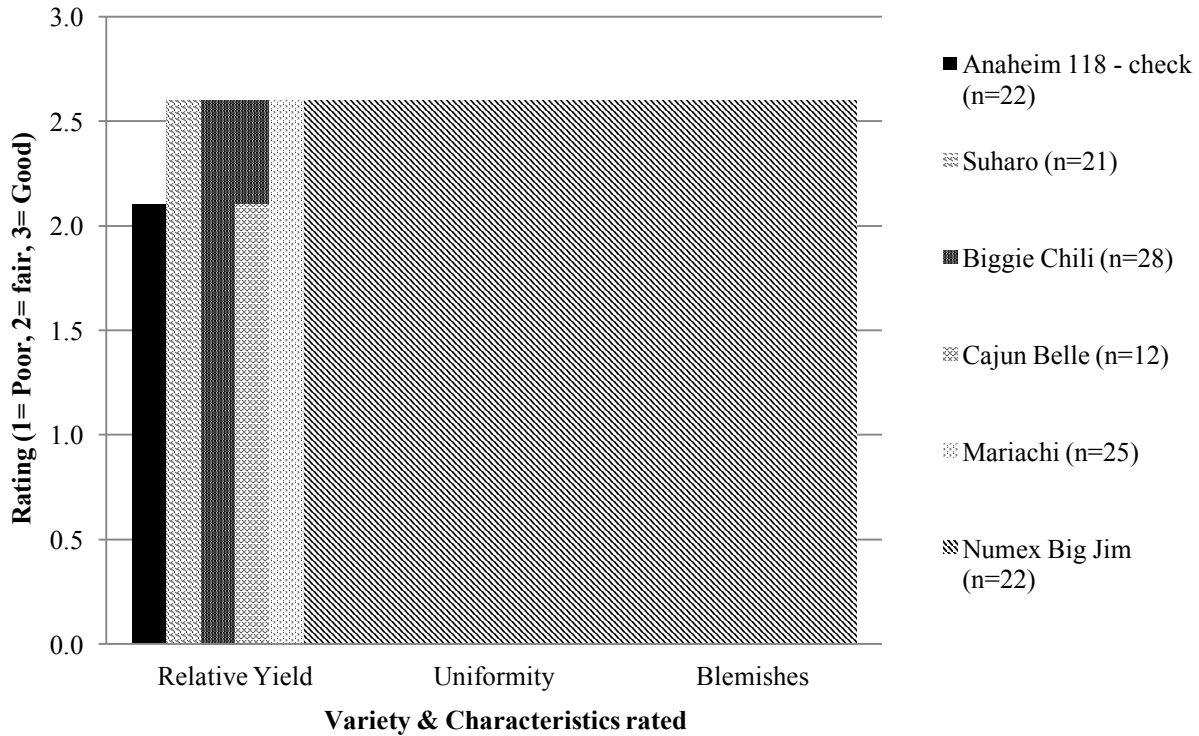


Figure 2. Chili pepper cultivar ratings for 2012.

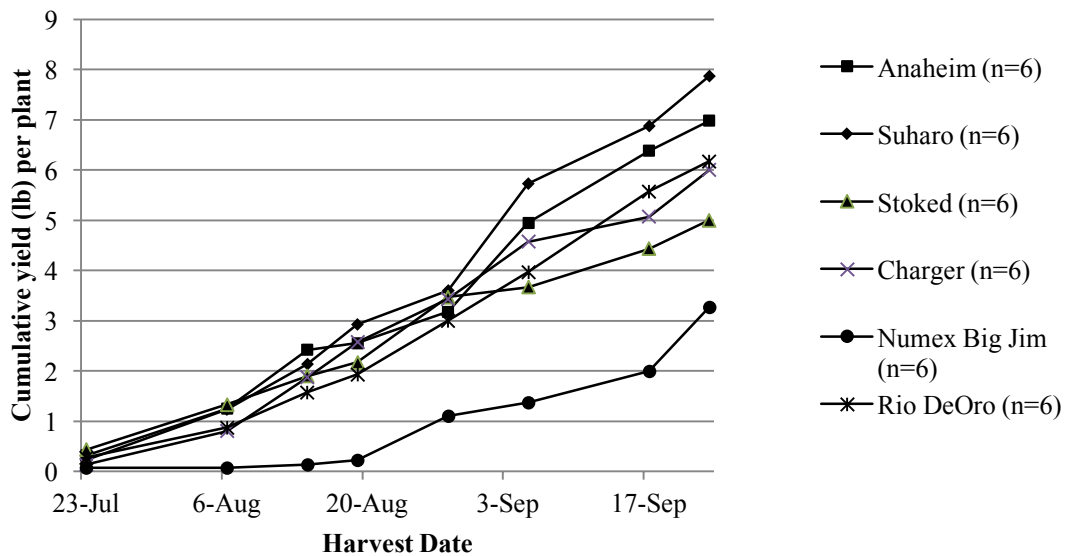


Figure 3. Yield data recorded in Buchanan County, Missouri, for chili peppers 2013.

An example of yield data from the Master Gardener site located in Buchanan County, Missouri, in 2013 is shown in Figure 3. In contrast to the mean ratings from all the Master Gardener sites (Figure 1), Suharo yielded the highest (close to 8lb/plant) and is the only cultivar to perform better than the check cultivar Anaheim, which yielded 7 lb/plant. Though Charger had a better

rating than the check cultivar (Figure 1), it yielded lower in this site. Poor performance of Charger was also recorded in a replicated study conducted in Manhattan, Kansas (Galgamuwa, 2013). Total yield for Nunex Big Jim is the lowest among all the cultivars tested in the site, and this is consistent with the mean ranking from all the sites.

Table 3. Jalapeno pepper cultivars evaluated.

2009	2010	2011	2012	2013
Agriset 4108 — Check	Agriset 4108 — Check	Agriset 4108 — Check	Agriset 4108 — Check	Agriset 4108 — Check
Meteor	Meteor	Tormenta	Centella	Centella
Colima	Colima	Felicity	Compadre	Compadre
Valor	Valor	Chichimeca	Suribachi	Ciclon
J-7	Telica	Telica	Telica	Telica
	ACR 125	J-7	Mucho Nacho	

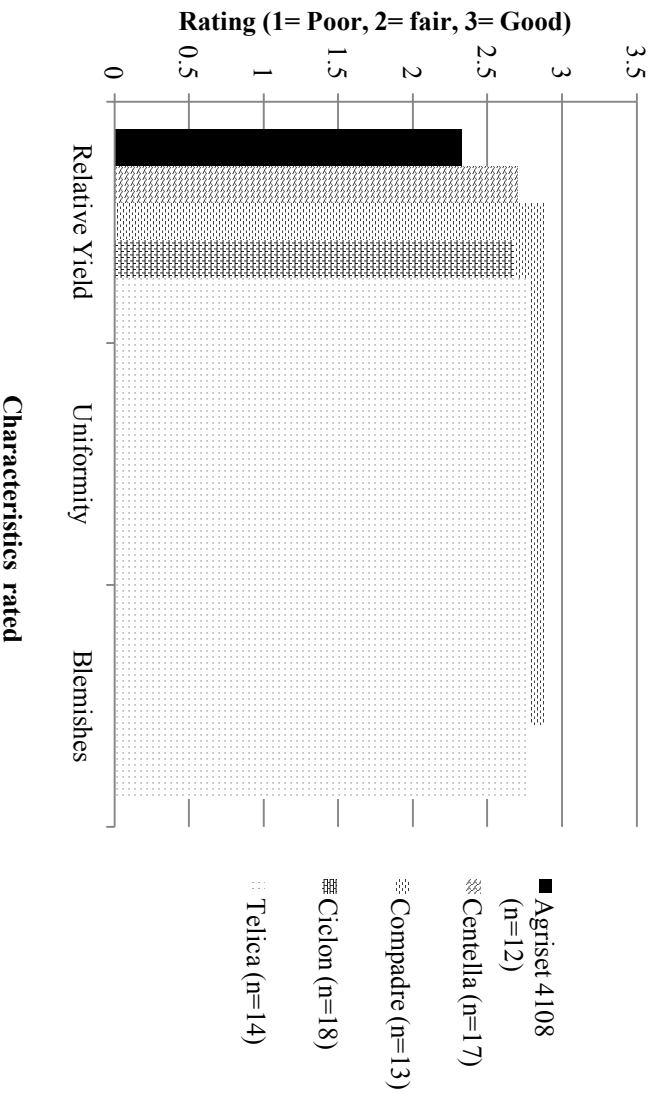


Figure 4. Jalapeno pepper cultivar ratings for 2013.

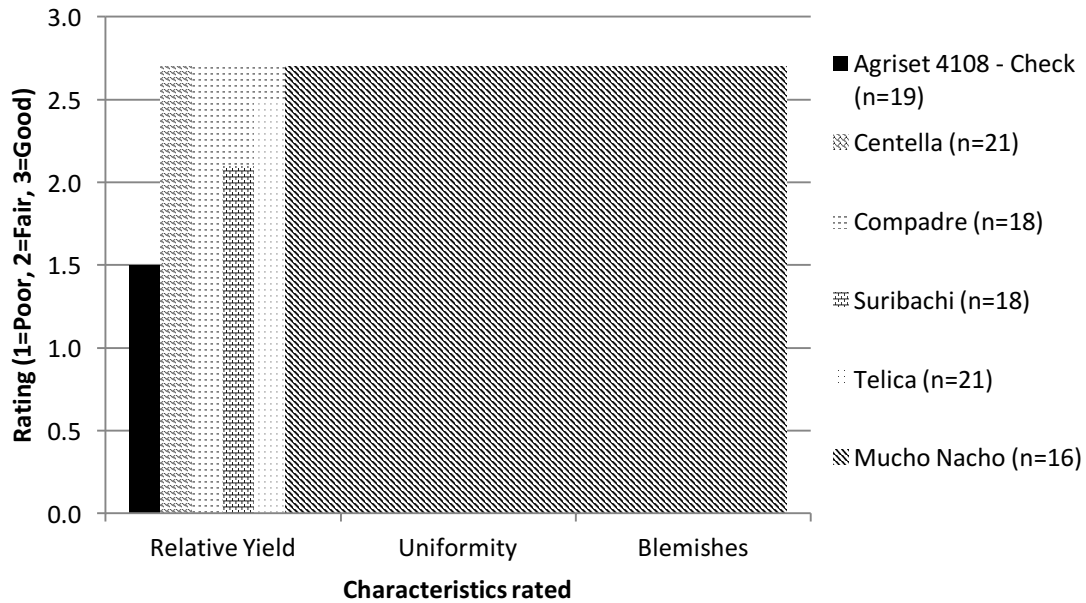


Figure 5. Jalapeno pepper cultivar ratings for 2012.

For jalapeno peppers, Telica obtained the highest rating for relative yield in 2013, which is consistent with the mean rating for 2012, in which Telica rated the highest along with Mucho Nacho (Figures 4 and 5). Mucho Nacho was not tested in 2013. In both years, check cultivar Agriset 4108 rated the lowest for relative yield. Compadre obtained the highest rating for uniformity and resistance to blemishes in both years. However, resistance to blemishes for Compadre is comparable to Mucho Nacho and Centella in 2012.

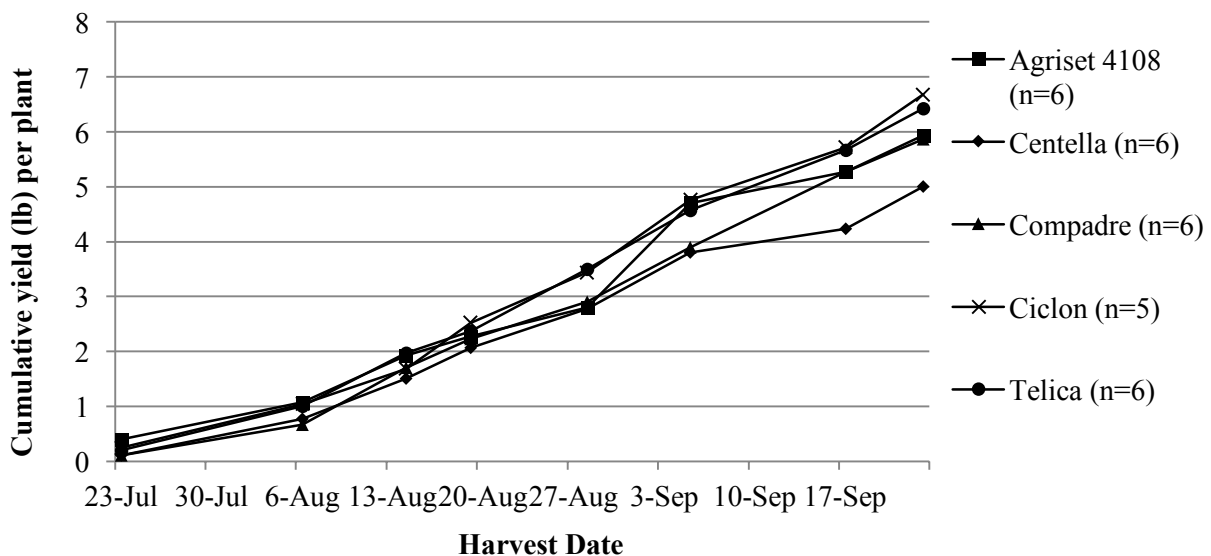


Figure 6. Yield data recorded in Buchanan County, Missouri for jalapeno pepper 2013.

Figure 6 depicts the yield data from the Buchanan County, Missouri, Master Gardener site. Total yield for all the cultivars tested was more than 5 lb/plant. The top two yielding cultivars (Ciclon and Telica) each averaged approximately 6.5 lb/plant. The check cultivar Agriset 4108 and Compadre each yielded close to 6 lb/plant.

Table 4. Recommended chili pepper cultivars.

Cultivar	Performance Exceeds Check	Sources
New Mexico Improved	Check	Burrell Seeds
Anaheim 118	Check	SW, PA, JS
Ancho Masivo	2/2	SW
Ancho Capulin	2/2	HR
Biggie Chili	2/2	TGS, HPS
Mariachi	3/4	HR, PA
Chili G76	2/3	HR
Mosco	2/3	Burrell Seeds

Table 5. Recommended jalapeno pepper cultivars.

Cultivar	Performance Exceeds Check	Sources
Telica	3/4 (1 time equal)	HR
Valor	2/2	SW
Centella	2/2	Rupp
Compadre	2/2	SW, ST

Considering the chili pepper cultivars, Ancho Masivo, Ancho Capulin, and Biggie Chili have been rated better than the check cultivar in two out of two years (Table 4). For jalapeno peppers, Telica has been rated better than the check cultivar in three out of four times, and equivalent once (Table 5). Tormenta, Valor, Centella and Compadre have earned better ratings in both years that they have been evaluated. Several chili pepper and jalapeno pepper cultivars have earned better ratings in the one year that they were evaluated, which needs to be confirmed in multiple years.

Chili pepper cultivar Numex Big Jim (Table 6) and jalapeno pepper cultivar J-7 (Table 7) performed poorly in both years they were evaluated.

Table 6. Chili pepper cultivars that have performed poorly.

Cultivar	Performance Exceeds Check
Numex Big Jim	0 / 2
Charger	0 / 1
Rio DeOro	0 / 1
Cajun Belle	0 / 1
Tiburón	0 / 1

Table 7. Jalapeno pepper cultivars that have performed poorly.

Cultivar	Performance Exceeds Check
J-7	0 / 2
ACR 125	0 / 1

Conclusions

Since replicated field plot data is not available locally, multi-locational observational data reported in this study provide valuable information for local vegetable growers. Cultivars that outperformed the check cultivar in multiple years can be recommended while the cultivars that were tested only once but performed better than the check will be evaluated again for consistency.

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