

2021 Vegetable Variety Trial Reports



Seed to Kitchen Collaborative
Michigan State University
Upper Peninsula Research and Extension Center

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<https://seedtokitchen.horticulture.wisc.edu/>

<https://www.canr.msu.edu/uprc/research>



Upper Peninsula Research
and Extension Center
MICHIGAN STATE UNIVERSITY

Project
GREEN

SKC  *Seed to Kitchen Collaborative*

Introduction

In 2021, the MSU Upper Peninsula Research and Extension Center (UPREC) received funding from MSU Project GREEN and MSU Extension to address the limitations of traditional vegetable variety research and outreach by implementing the [Seed to Kitchen Collaborative](#) project in Michigan. The Seed to Kitchen Collaborative, started by Dr. Julie Dawson at the University of Wisconsin-Madison, brings together vegetable breeders, seed companies, researchers, organic vegetable growers and professional chefs to evaluate the productivity and quality of elite vegetable varieties in organic research station and on-farm trials. This year, the North Farm at UPREC grew 58 different varieties of five vegetables in replicated variety trials including winter squash (Pg. 3), bell pepper (Pg. 8), carrot (Pg. 13), cucumber (Pg. 22), and tomato (not reported). Our 2021 tomato trial was a participatory breeding project, which is not reported here. Michigan and Wisconsin farmers also grew subsets of these vegetables and collected observations on their farm to capture the practitioner's point of view.

Organic growers face unique challenges related to soil fertility, pest management, etc., which provide a special context for vegetable variety testing. Furthermore, customers buying local organic produce at a farmers market, the local food co-op, or for use in a restaurant expect that the vegetables they buy will not only be plentiful and beautiful, but also tasty. That is why Seed to Kitchen Collaborative collects sensory (tasting) data post-harvest in addition to yield and quality data in the field. This year, we worked with Taste the Local Difference to recruit eight local chefs and their crews to participate in Seed to Kitchen Collaborative sensory evaluation. Their expert palates provided valuable feedback on the flavor, texture and desirability of our many vegetable varieties.

Due to the COVID-19 pandemic, collecting sensory data looked a little different from the group tasting event we hoped for. The process started at the North Farm with harvesting, washing and packing the produce for tasters. The North Farm is certified organic and GAP certified annually to ensure the highest standards for food safety are consistently maintained. At the time of packing, individual vegetables were labeled with an alpha-numeric code so as to not bias tasters who may be familiar with certain varieties/variety names. Tasting boxes were then delivered to local chefs on Fridays. When chefs received a box, they scanned a QR code inside to access the tasting survey, tasted the produce, and entered their responses online. The sensory data was then summarized and reported alongside yield and quality info generated on the farm. Here we report 'overall flavor' and 'willingness to purchase' sensory data. Additional sensory data is available upon request from the authors.

A big "Thank You!" to all of the people and organizations that made our 2021 trials possible, including the Dr. Julie Dawson lab at UW-Madison, Sarah DeGraff, participating seed companies and breeders, Kendra Wilhelm, Marleigh Sherbinow, Taste the Local Difference, Marquette Food Co-op, NMU Dining Services, Humble Turnip, Border Grill, Iron Bay, Delft Bistro, MARESA, and others!

A note on interpreting box plots: A boxplot is a way to show the distribution and centers of a data set. The main part of the chart (the "box") shows where the middle portion of the data is: the interquartile range. At the ends of the box, you find the first quartile (the 25% mark) and the third quartile (the 75% mark). The bottom of the chart (at the end of the bottom "whisker") is the minimum (the smallest number in the set) and the top is the maximum (the largest number in the set). Finally, the median is represented by a horizontal bar in the center of the box.



2021 Winter Squash Variety Report

Seed to Kitchen Collaborative
Michigan State University
Upper Peninsula Research and Extension Center

Management

In 2021, four *C. maxima* winter squash varieties were trialed at the MSU Upper Peninsula Research and Extension Center in Chatham, MI. Squash was seeded in the greenhouse May 4 into 2 inch soil blocks using Morgan Composting Dairy Doo Seed Starter 101 soil media. Plants were then potted-up to 4 inch plastic pots on May 14, and transplanted into the field June 3. Plots 3 ft wide x 14 ft long were laid out in a RCBD design with four replications. Fertility was applied just prior to planting, and consisted of beef cattle manure compost applied at 28,000 lbs/ac (0.64 lbs/ft²). Plants were spaced 2 ft. apart in-row, with 1 row per bed and 9 ft between beds. Irrigation was provided 2 hrs weekly via one line of drip tape. To control cucumber beetles, Surround (kaolin clay) was applied twice during the growing season on June 8 and 14. Weeds were controlled with plastic mulch and string trimming between beds. Squash was harvested September 22.

Varieties tested:



<u>Supplier</u>	<u>Variety</u>	<u>Market Class</u>	<u>Color</u>
Johnny's	JWS 16-42-52	Kabocha	Orange



Siskiyou Seeds	Stella Blue	Kabocha	Slate blue
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Johnny's	Winter Blush	Kabocha	Pale orange
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Johnny's	Winter Sweet	Kabocha	Slate blue
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Traits

Plant Count, Marketable Count, Marketable Weight (lbs), Unmarketable Weight (lbs), and Proportion Unmarketable.

Notes on trait measurement:

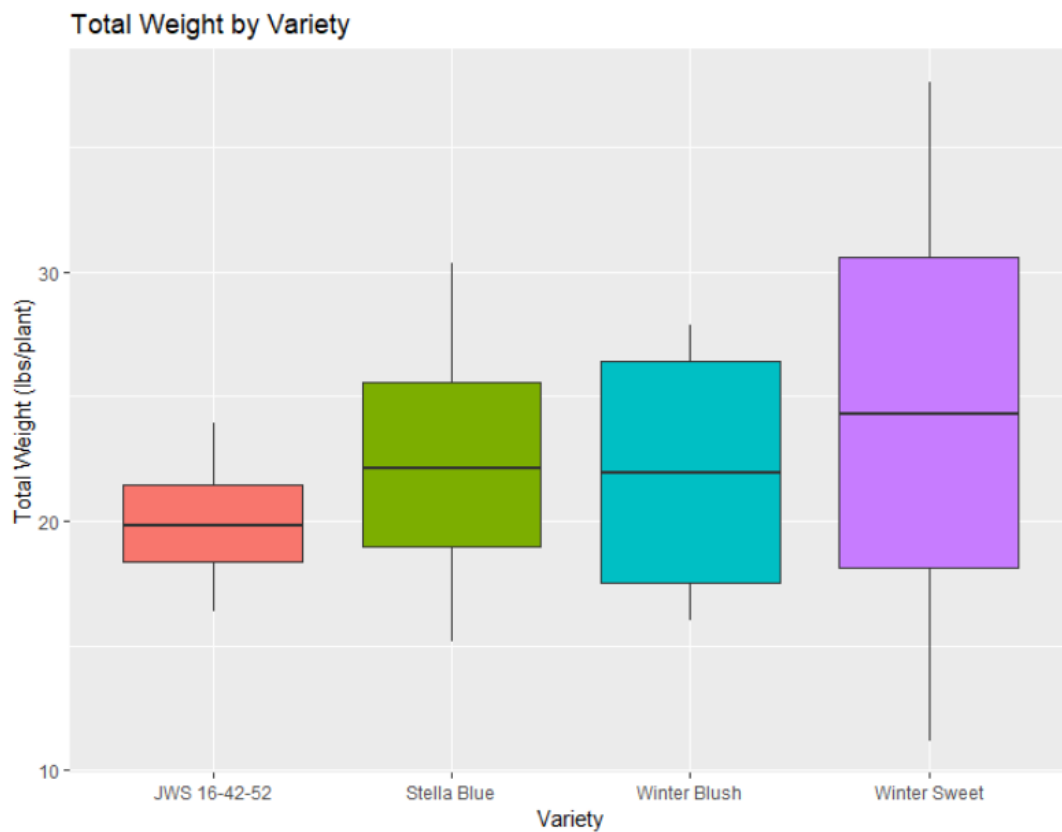
Harvest was done at the end of the season once vines had begun to senesce. Fruits were weighed and graded the day of harvest, September 22. Analysis was conducted at the per plant level.



Quality Evaluation

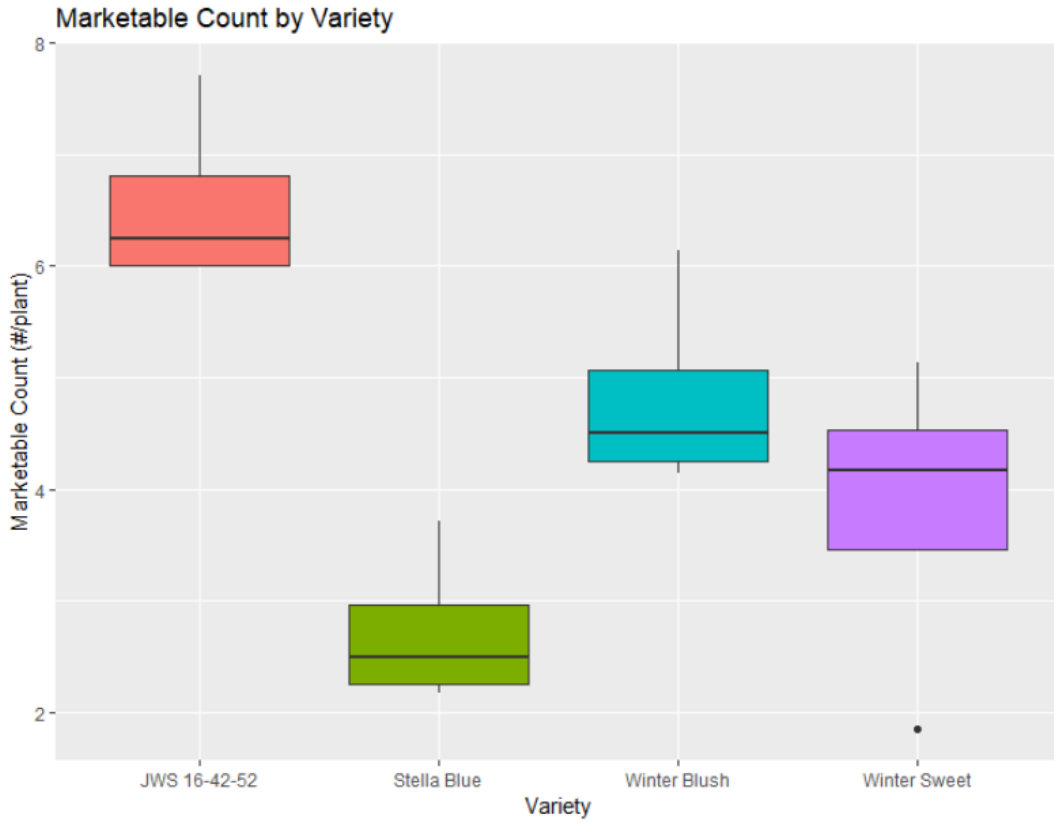
Chef taste testing:

Flavor evaluation was done by eight local chefs in the Marquette/Alger County area November 16 to December 6, after the squash had cured. Varieties were packed with an individual alphanumeric code (no variety names were included in boxes). Boxes were delivered to chefs, including instructions for evaluation and a QR code linking to Qualtrics where data was entered. Squashes were baked at 350 degrees F for 30 minutes prior to tasting. Flavor intensity and complexity were rated on a scale of 1 (low) to 5 (high). Appearance, texture, and overall flavor were rated from 1 (poor) to 5 (excellent). The likelihood that they would buy it for their restaurant (1=no way, 5=yes, definitely) and perceived ease of preparation (1=difficult, 5 = easy) were also rated.

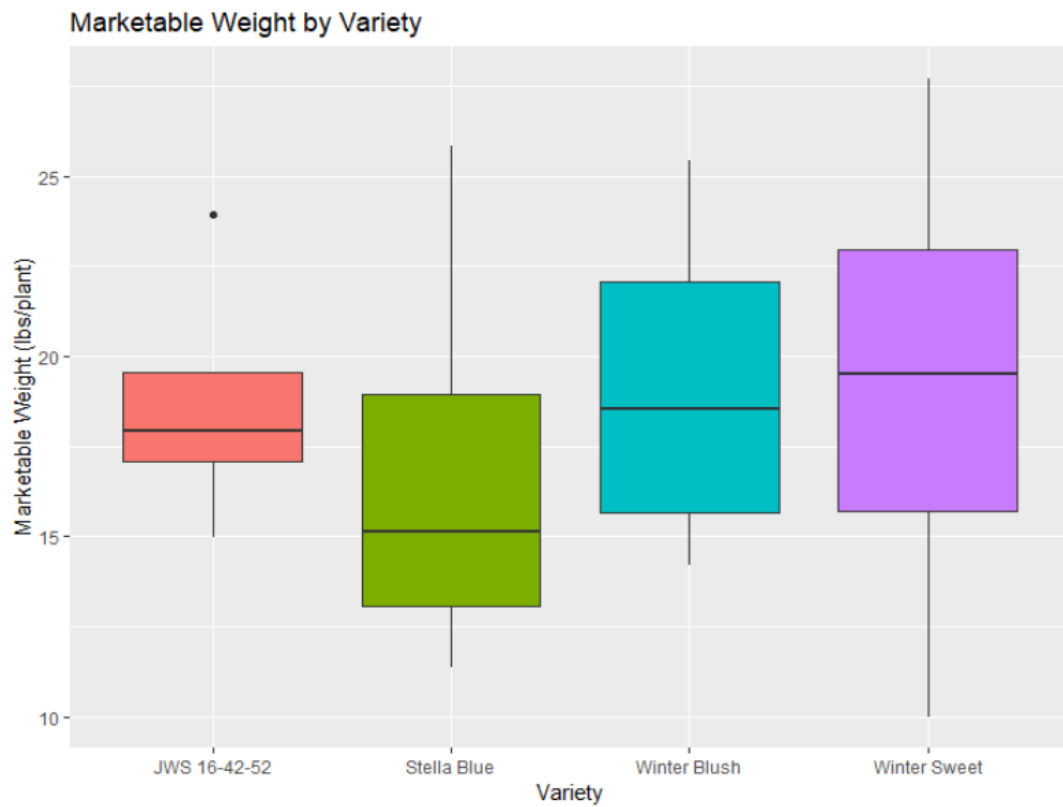


Squash total weight



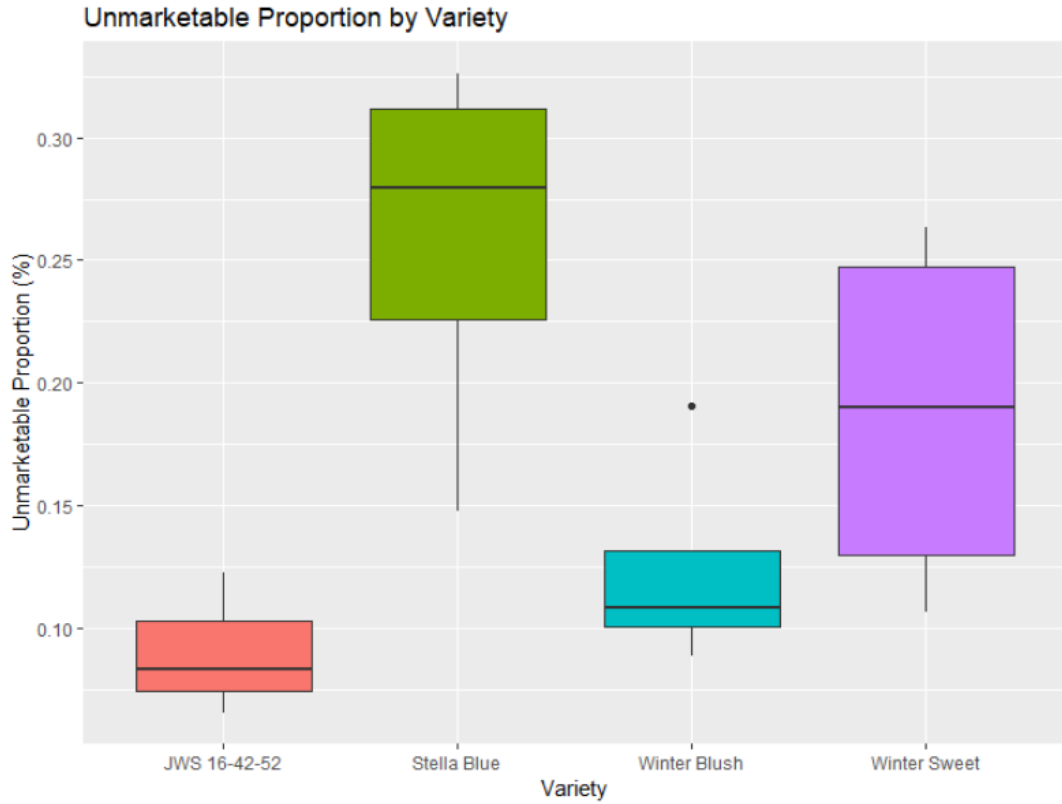


Squash marketable count

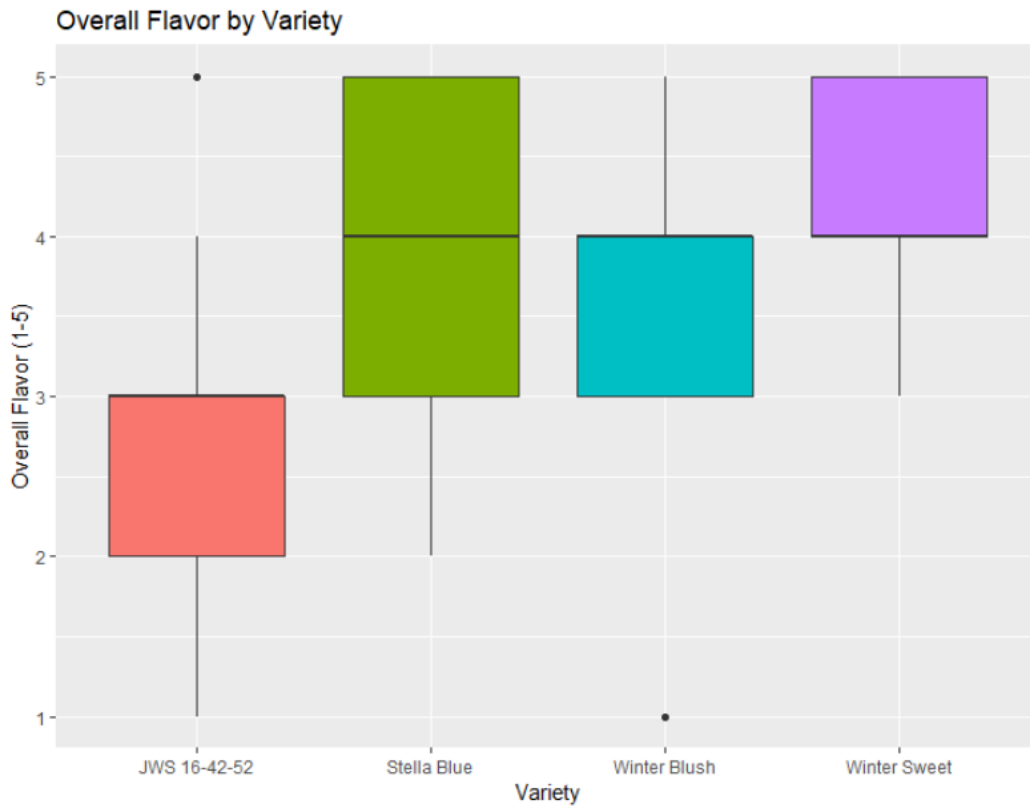


Squash marketable weight



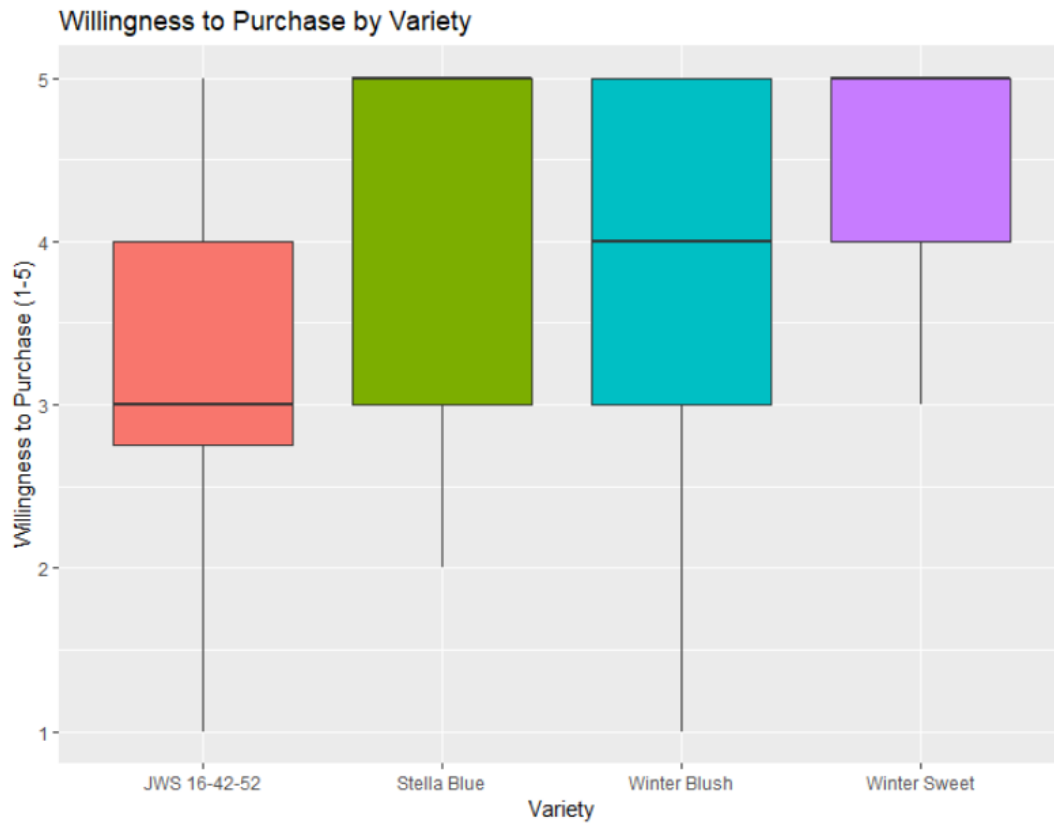


Squash unmarketable proportion



Squash overall flavor





Squash willingness to purchase

C. maxima Winter Squash (field)

(* indicates varieties statistically similar to the “best” variety in each category shown in BOLD)

Variety	Total weight (lbs/plant)	Marketable Count (#/plant)	Marketable Weight (lbs/plant)	Unmarketable Proportion (%)	Overall Flavor (1-5)	Willingness to Purchase (1-5)
JWS 16-42-52	19.98*	6.55	18.69*	9%	2.74	3.19
Stella Blue	22.45*	2.72	16.87*	26%	3.79	4.18*
Winter Blush	21.95*	4.82	19.19*	12%*	3.68	3.69
Winter Sweet	24.37	3.83	19.18*	19%*	4.33	4.50



2021 Bell Pepper Variety Report

Seed to Kitchen Collaborative
Michigan State University
Upper Peninsula Research and Extension Center

Management

In 2021, five early bell pepper varieties were trialed at the MSU Upper Peninsula Research and Extension Center in Chatham, MI. Peppers were seeded in the greenhouse April 9 into 3/4 inch soil blocks using Morgan Composting Dairy Doo Seed Starter 101 soil media, potted up to 4 inch plastic pots on May 2, and transplanted into the hoop house June 11. Plots 3 ft wide x 5 ft long were laid out in a RCBD design with four replications. Fertility was applied just prior to planting, and consisted of a poultry based 7-6-5 fertilizer from Morgan's Composting called Healthy Garden applied at 1,450 lbs/ac (0.033 lb/ft²). Plants were spaced 16 inches apart in-row, with 2 staggered rows per bed, and trellised using the Florida weave method. Irrigation was provided 2 hrs weekly via two lines of drip tape. Weeds were controlled with hoeing and hand weeding. Peppers were harvested weekly July 27 – September 10.

Varieties tested

	<u>Supplier</u>	<u>Variety</u>	<u>Market Class</u>	<u>Color</u>
	Johnny's	Ace	Early Bell	Green to Red
	Enza Zaden	Beachcraft	Early Bell	Green to Red
	Fedco	King of the North	Early Bell	Green to Red
	North Circle	King of the North Circle	Early Bell	Green to Red
	Nature & Nurture	Wisconsin Lakes	Early Bell	Green to Red

Traits

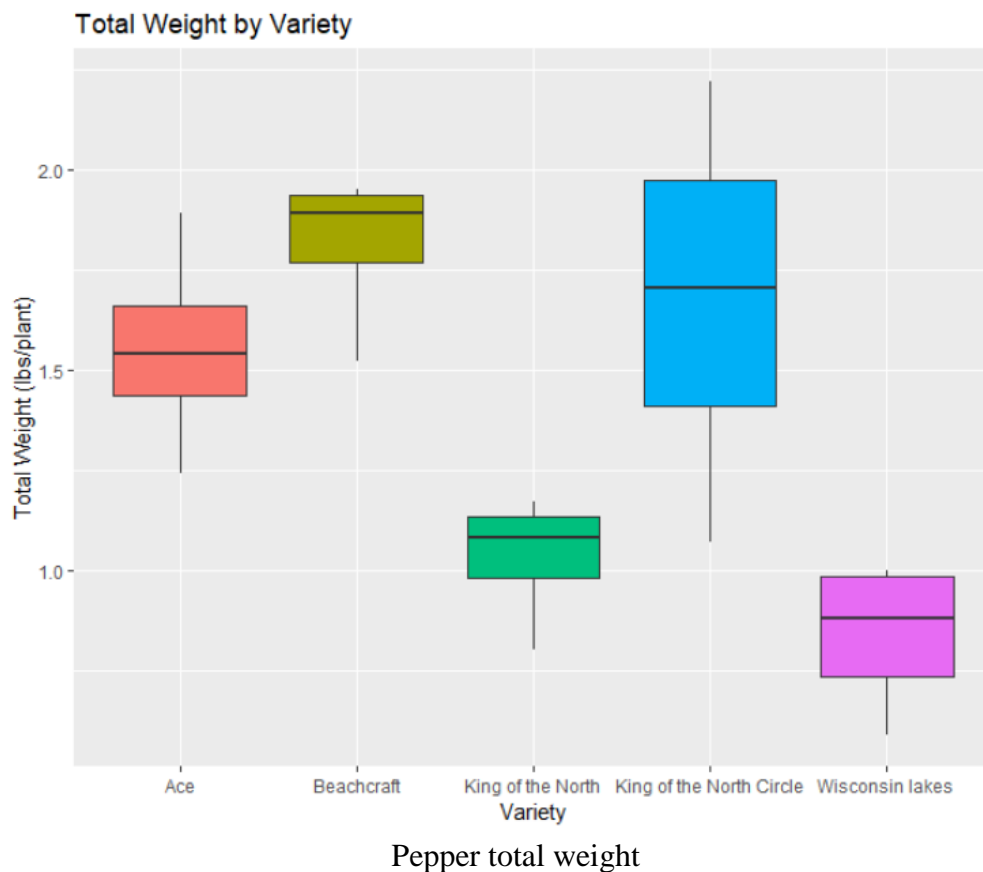
Marketable Count, Marketable Weight (lbs), Unmarketable Count, Unmarketable Weight (lbs), Proportion Unmarketable. Analysis was conducted at the per plant level.

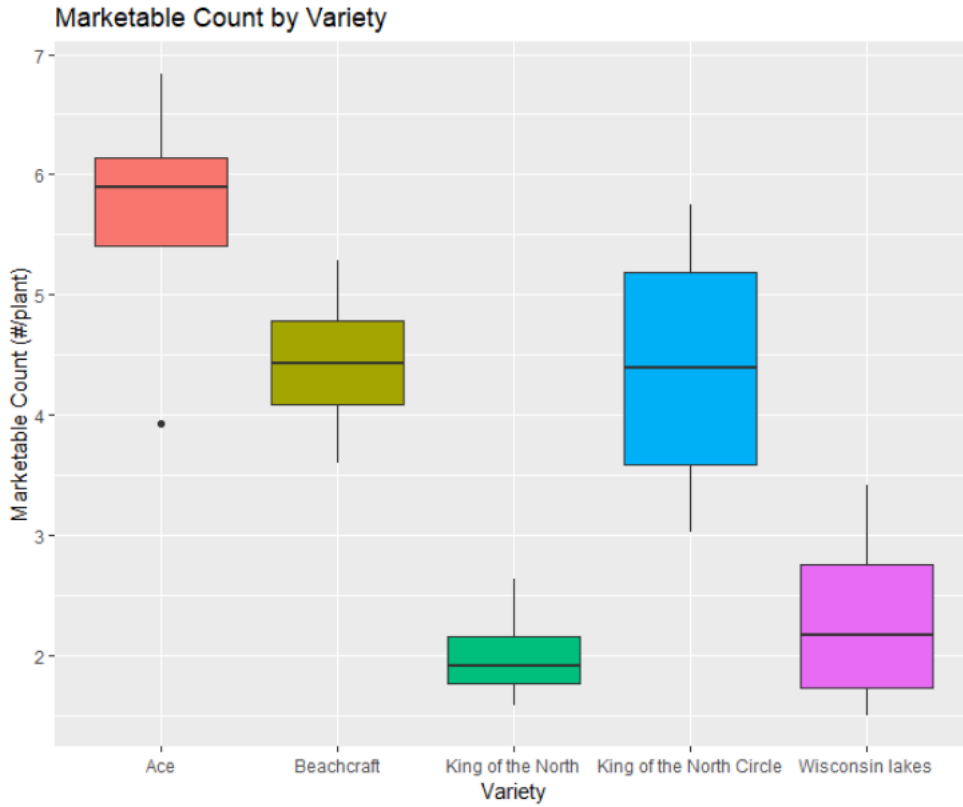


Quality Evaluation

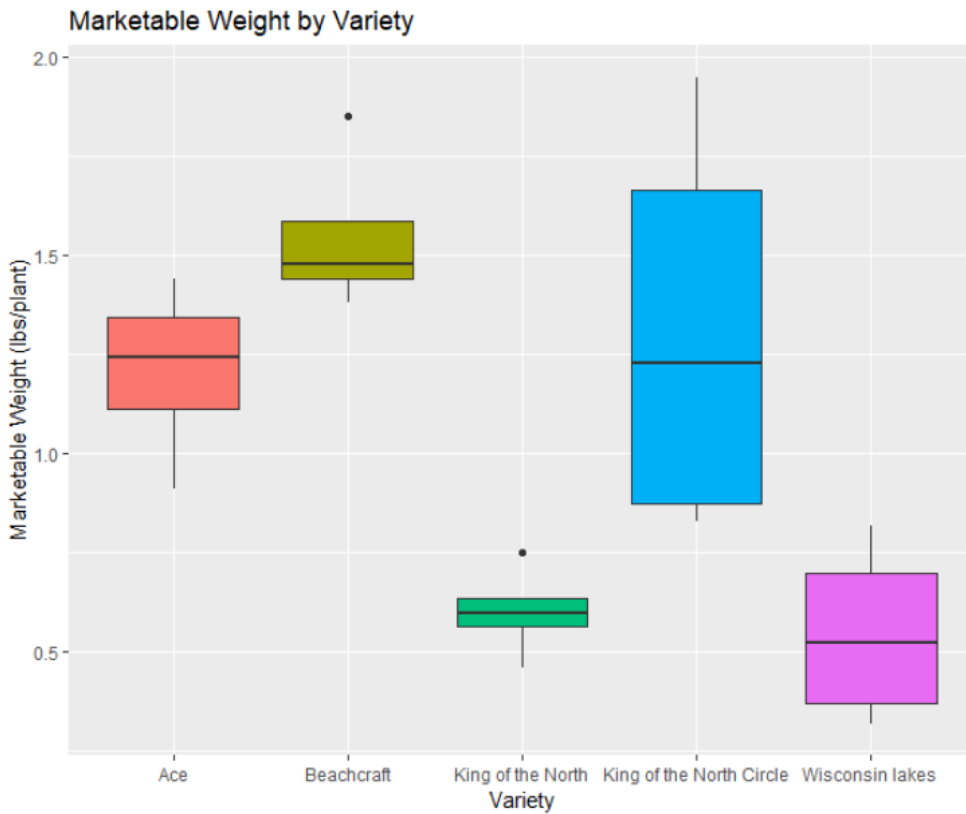
Chef taste testing:

Flavor evaluation was done by eight local chefs in the Marquette/Alger County area. Varieties were packed with an individual alphanumeric code (no variety names were included in boxes). Boxes were delivered to chefs, including instructions for evaluation and a QR code linking to Qualtrics where data was entered. Flavor intensity and complexity were rated on a scale of 1 (low) to 5 (high). Appearance, texture, and overall flavor were rated from 1 (poor) to 5 (excellent). The likelihood that they would buy it for their restaurant (1=no way, 5=yes, definitely) and perceived ease of preparation (1=difficult, 5 = easy) were also rated.



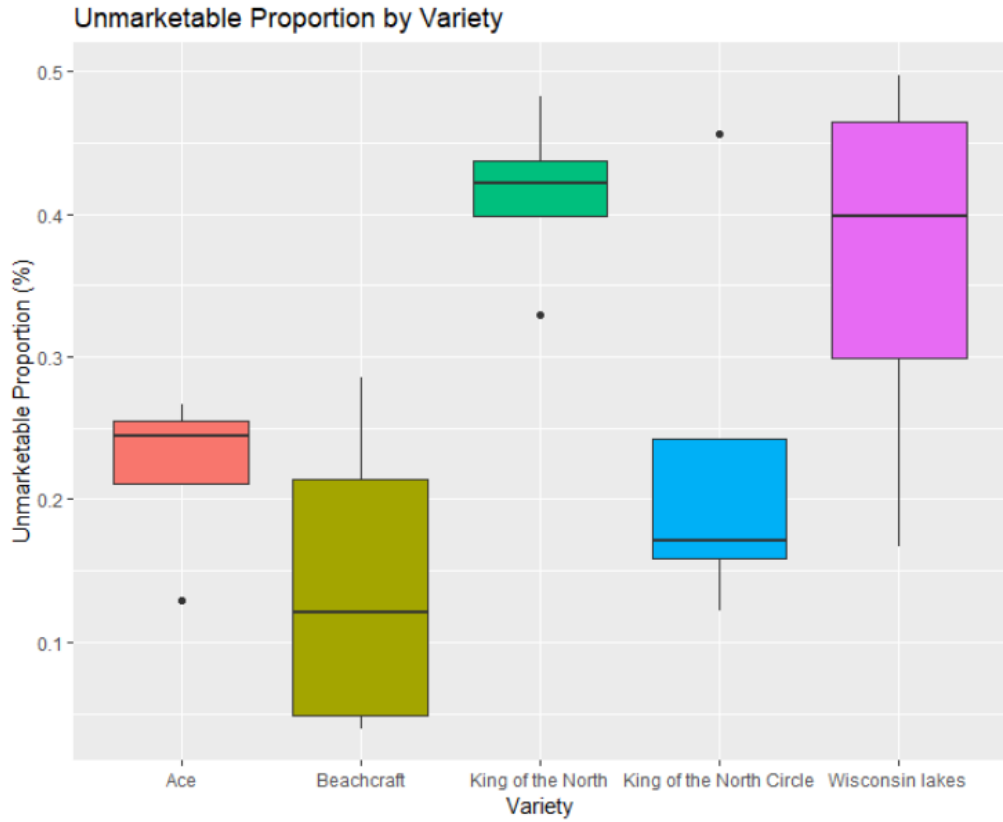


Pepper marketable count

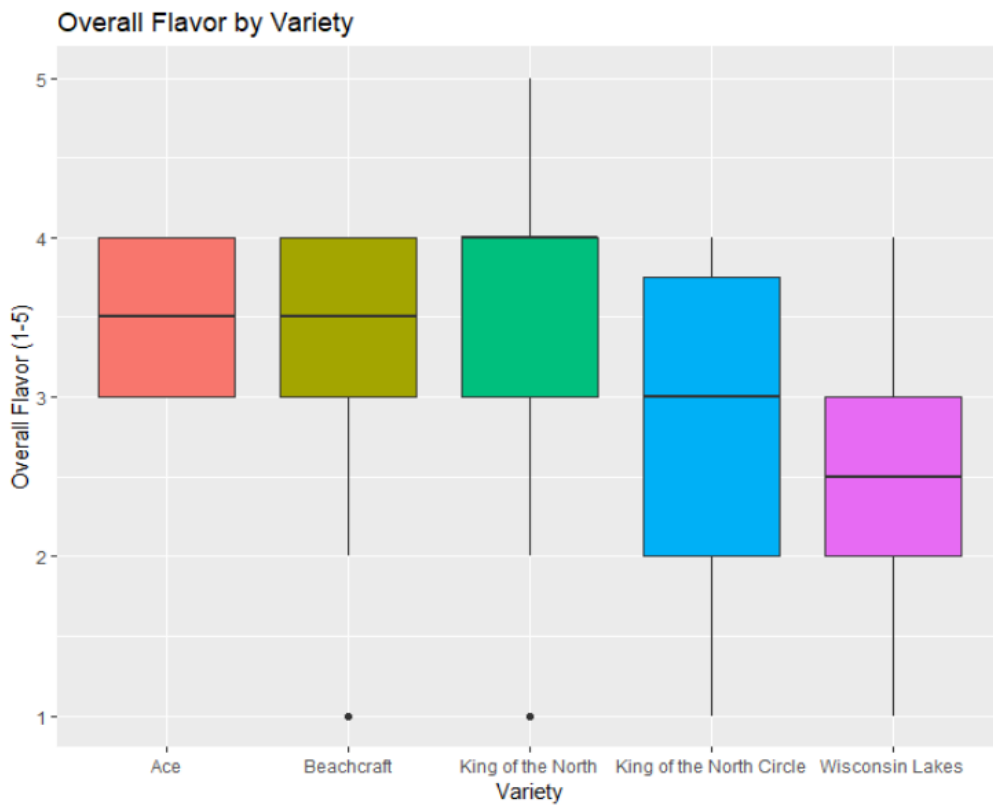


Pepper marketable weight



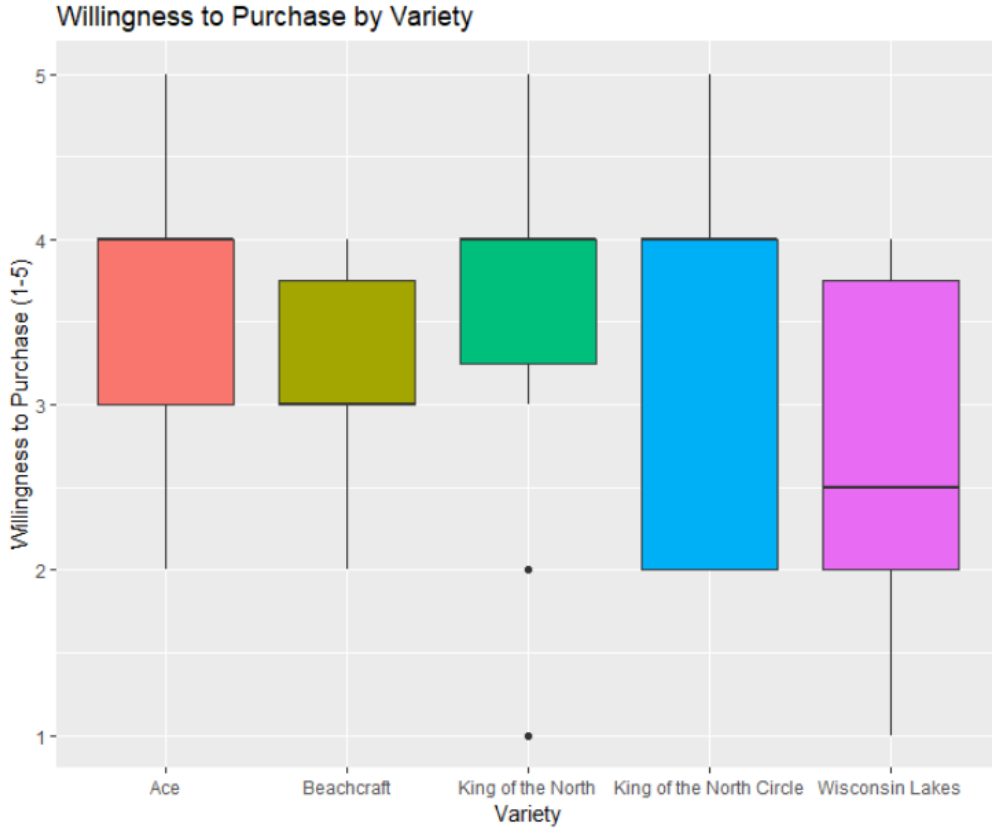


Pepper unmarketable proportion



Pepper overall flavor





Pepper willingness to purchase

Early Bell Peppers (high tunnel)

(* indicates varieties statistically similar to the “best” variety in each category shown in **BOLD**)

Variety	Total weight (lbs/plant)	Marketable Count (#/plant)	Marketable Weight (lbs/plant)	Unmarketable Proportion (%)	Overall Flavor (1-5)	Willingness to Purchase (1-5)
Ace	1.55*	5.64	1.21*	22%*	3.50	3.70
Beachcraft	1.81	4.44	1.55	14%	3.20*	3.10*
King of the North	1.03	2.01	0.60	41%	3.40*	3.60*
King of the North Circle	1.68*	4.39	1.31*	23%*	2.80*	3.44*
Wisconsin Lakes	0.84	2.32	0.55	37%	2.50*	2.60*



2021 Carrot Variety Report

Seed to Kitchen Collaborative
Michigan State University
Upper Peninsula Research and Extension Center

Management

In 2021, ten carrot varieties (five orange, five purple) were trialed at the MSU Upper Peninsula Research and Extension Center in Chatham, MI. Plots 3.33 ft wide x 7 ft long were laid out in a RCBD design with 3-4 replications. Prior to planting, a cover crop of buckwheat was seeded in the field May 11 and terminated June 24. Fertility was applied just prior to planting, and consisted of a feather meal based 10-0-4 fertilizer from Morgan's Composting called Safe Green Lawn applied at 500 lbs/ac (0.011 lb/ft²). Raw carrot seed was direct-seeded in 3 rows per plot (13 in spacing) July 15 on open raised beds made with a rototiller and custom bed shaper. Soil was kept moist with overhead irrigation until germination, and watered with overhead irrigation as needed throughout the growing period. Plots were thinned to 1 in between carrots in-row on August 10. Weeds were controlled with flame weeding (pre-emerge), hoeing and hand weeding. Carrots were harvested October 14 (orange) and October 21 (purple).

Varieties tested

	<u>Supplier</u>	<u>Variety</u>	<u>Market Class</u>	<u>Color</u>
	Bejo	Adelaide	Nantes (baby)	Orange
	Johnny's	Bolero	Nantes	Orange
	High Mowing	Dolciva	Nantes	Orange
	Bejo	Napoli	Nantes	Orange
	Bejo	Yaya	Nantes	Orange
	Johnny's	Deep Purple	Imperator	Purple
	Siskiyou	Dragon	Imperator	Purple
	Johnny's	Purple Elite	Imperator	Purple
	Johnny's	Purple Haze	Imperator	Purple
	Johnny's	Purple Sun	Imperator	Purple



Traits field: Marketable Count, Marketable Weight (kg), Unmarketable Count, Unmarketable Weight (kg), Plant Height (cm).

Notes on trait measurement:

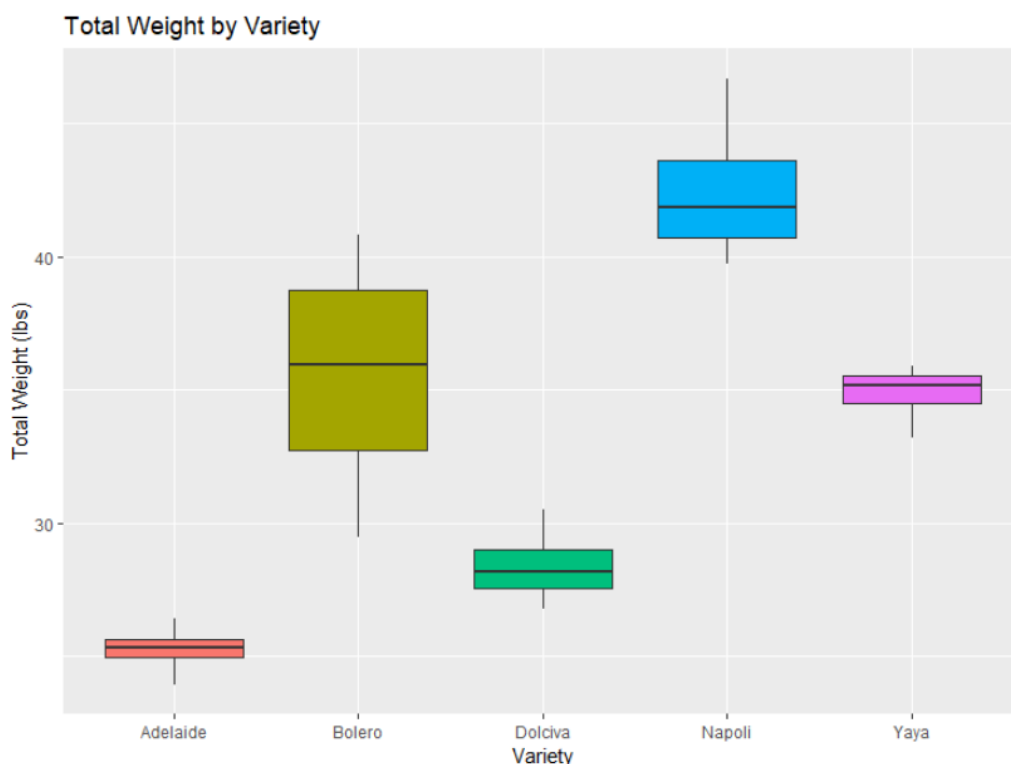
Top height was measured before harvest at three points in each plot and averaged. Analysis was conducted at the per plot level. Comparisons were made within market classes (colors).

Quality evaluation

Chef taste testing:

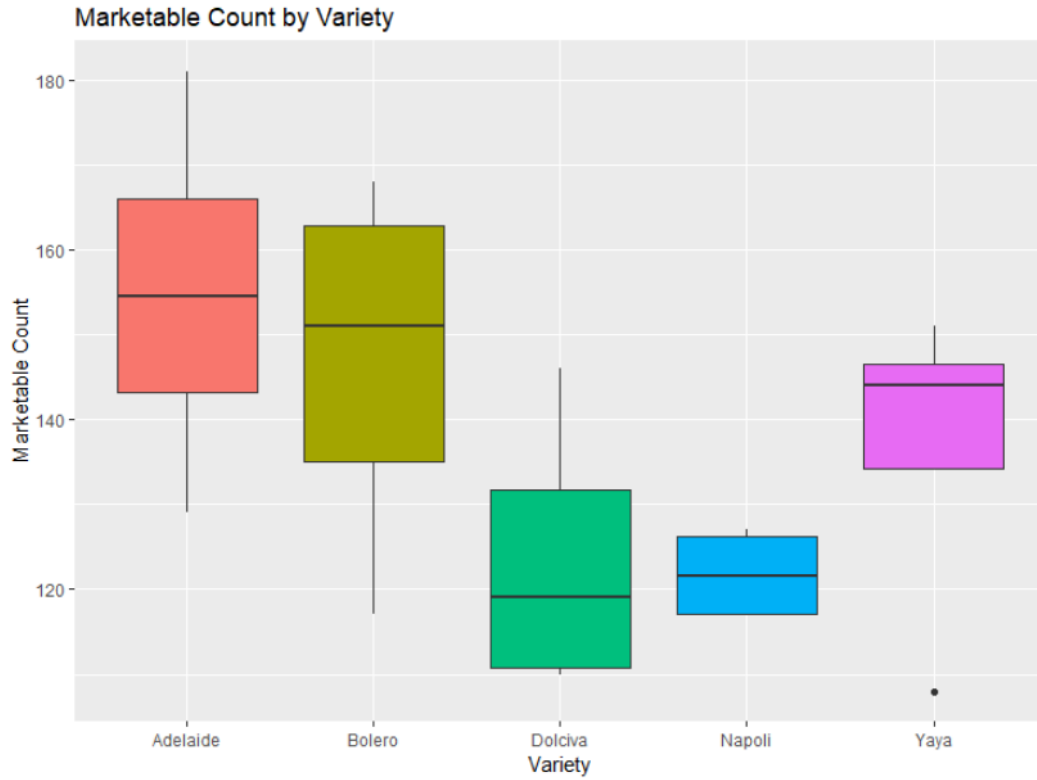
Flavor evaluation was done by eight local chefs in the Marquette/Alger County area.

Varieties were packed with an individual alphanumeric code (no variety names were included in boxes). Boxes were delivered to chefs, including instructions for evaluation and a QR code linking to Qualtrics where data was entered. Flavor intensity and complexity were rated on a scale of 1 (low) to 5 (high). Appearance, texture, root size, and overall flavor were rated from 1 (poor) to 5 (excellent). The likelihood that they would buy it for their restaurant (1=no way, 5=yes, definitely) and perceived ease of preparation (1=difficult, 5 = easy) were also rated.

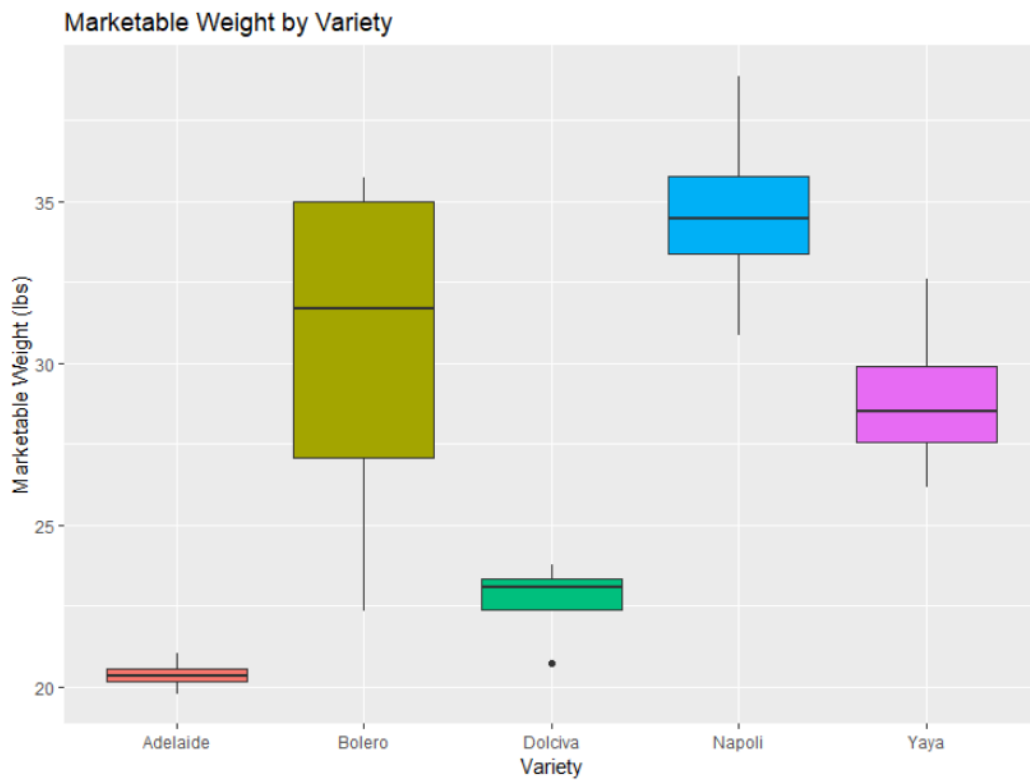


Orange carrot total weight



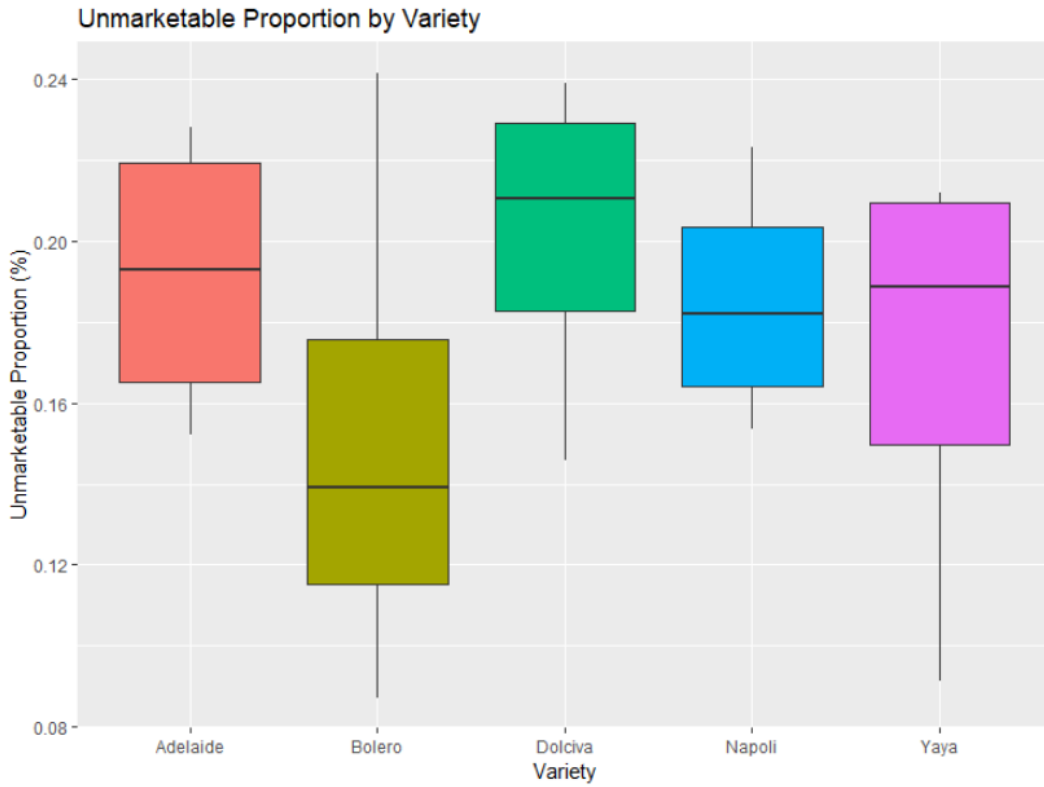


Orange carrot marketable count

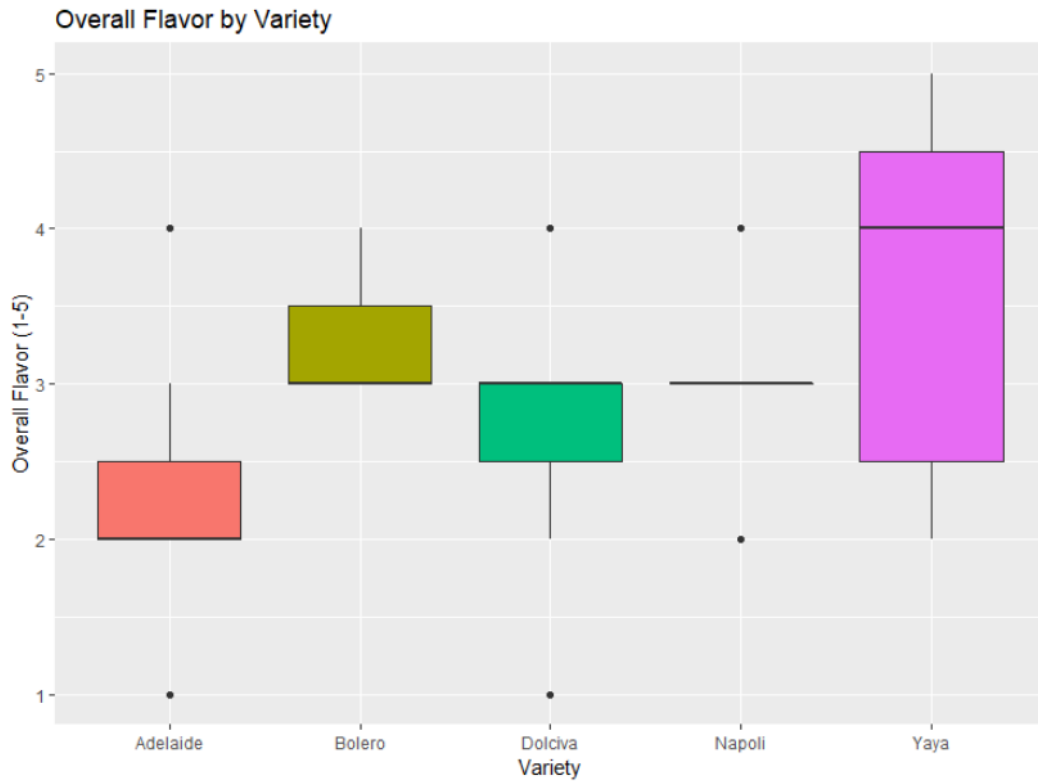


Orange carrot marketable weight



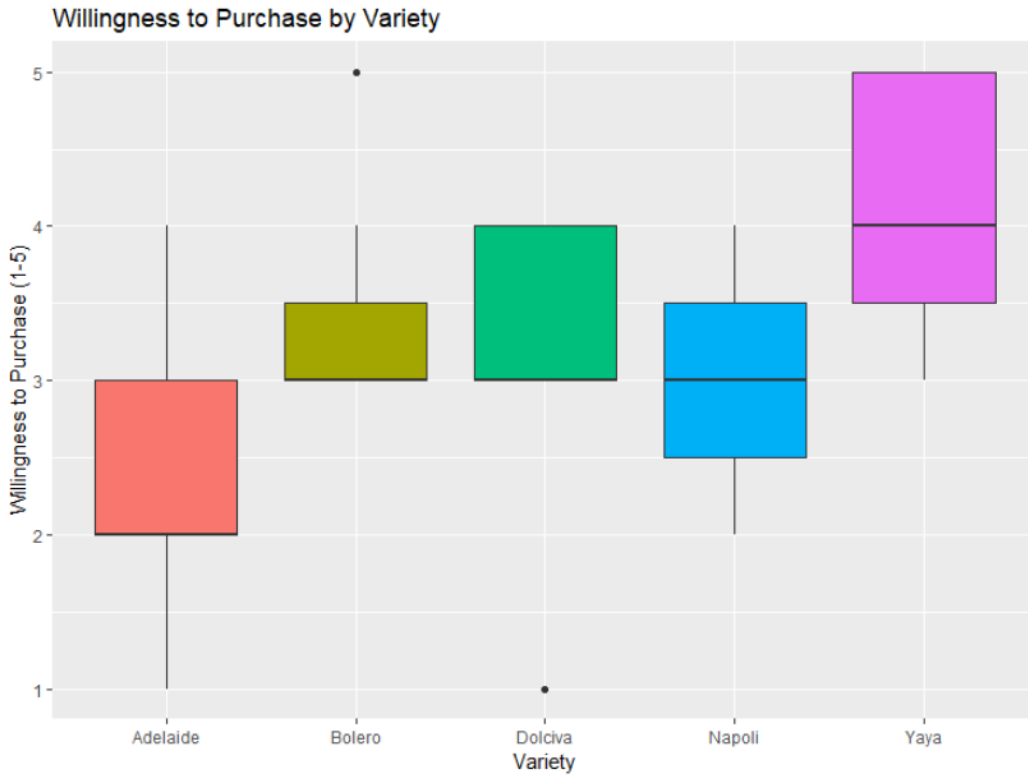


Orange carrot unmarketable proportion



Orange carrot overall flavor





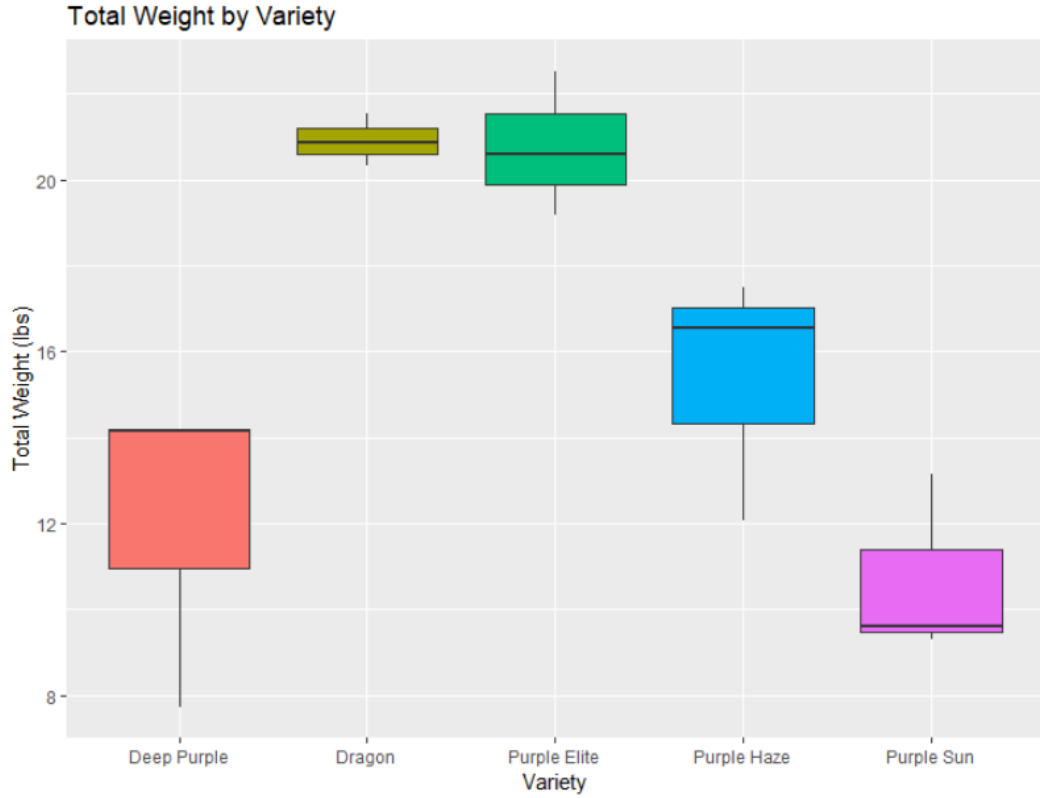
Orange carrot willingness to purchase

Orange Carrots (field)

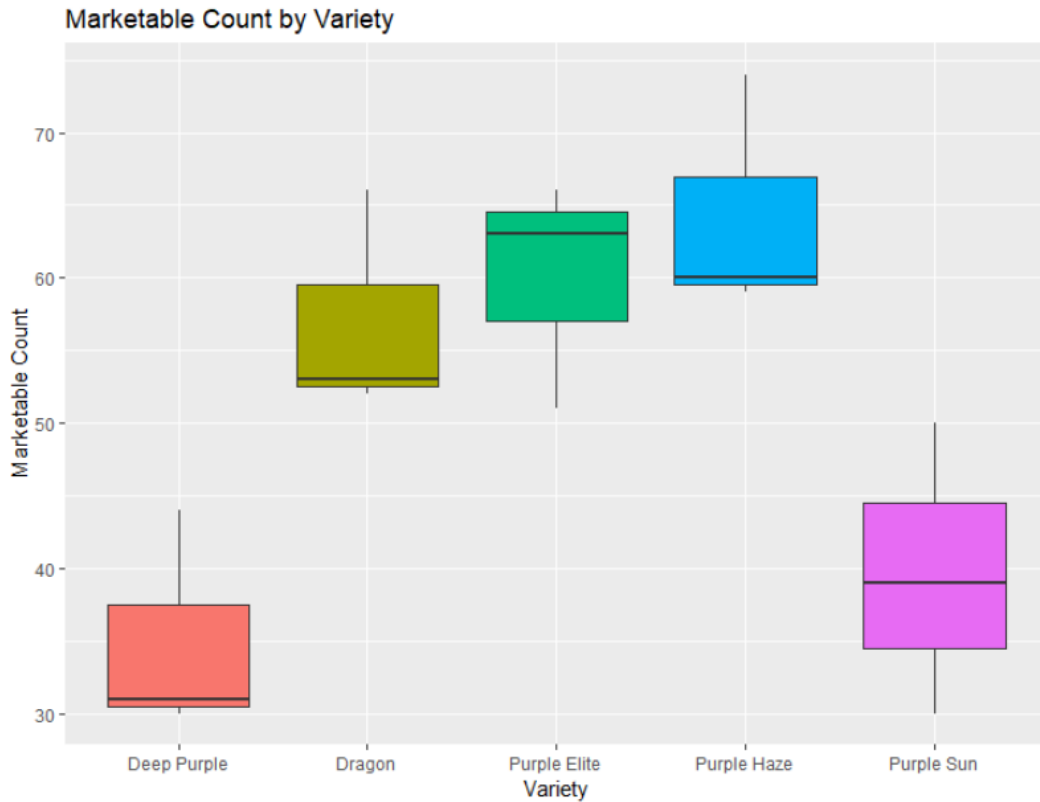
(* indicates varieties statistically similar to the “best” variety in each category shown in **BOLD**)

Variety	Total weight (lbs/plot)	Marketable Count (#/plot)	Marketable Weight (lbs/plot)	Unmarketable Proportion (%)	Overall Flavor (1-5)	Willingness to Purchase (1-5)
Adelaide	25.24	154.75	20.38	19%*	2.29	2.43
Bolero	35.55	146.75*	30.37	15%	3.29*	3.43*
Dolciva	28.40	123.50*	22.66	20%*	2.71*	3.14*
Napoli	42.51	121.75*	34.67	19%*	3.00*	3.00*
Yaya	34.84	136.75*	28.94	17%*	3.57	4.14



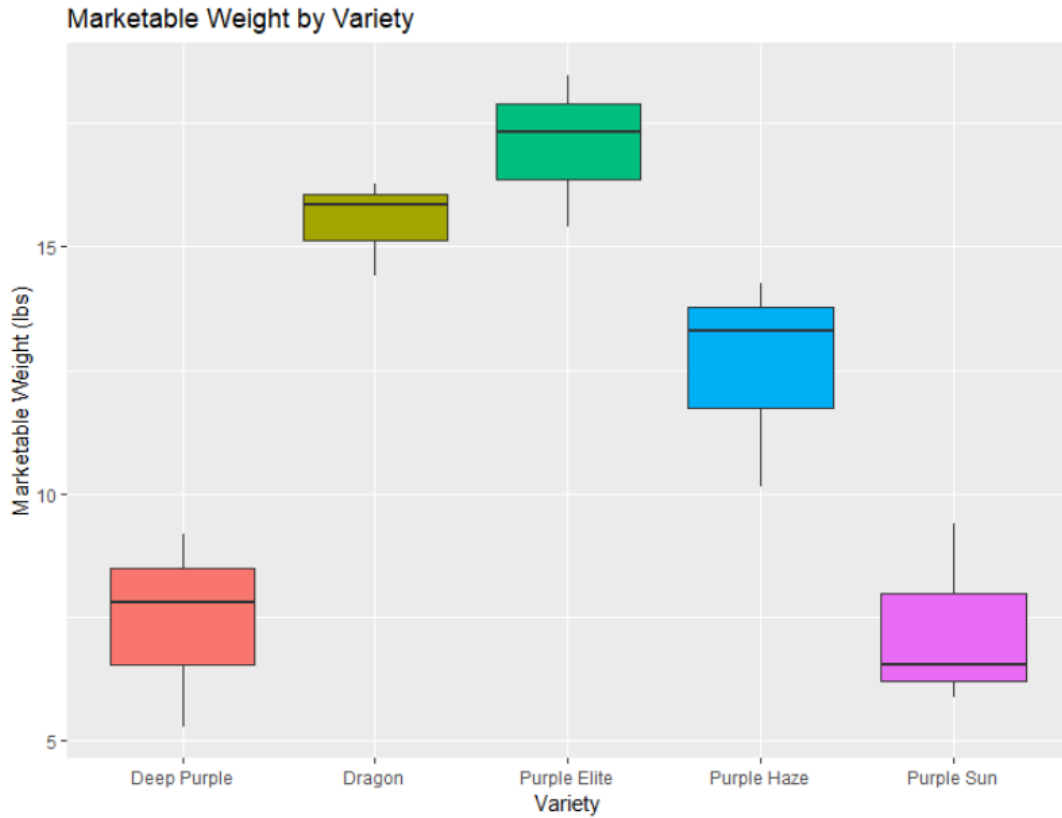


Purple carrot total weight

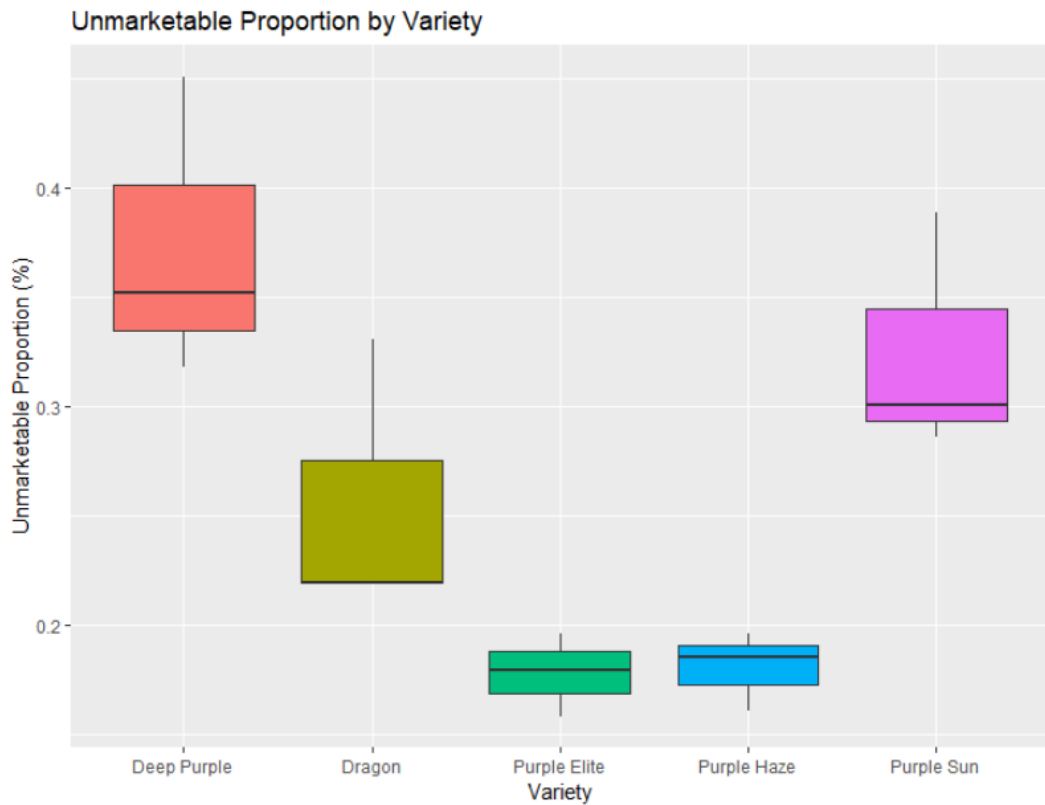


Purple carrot marketable count



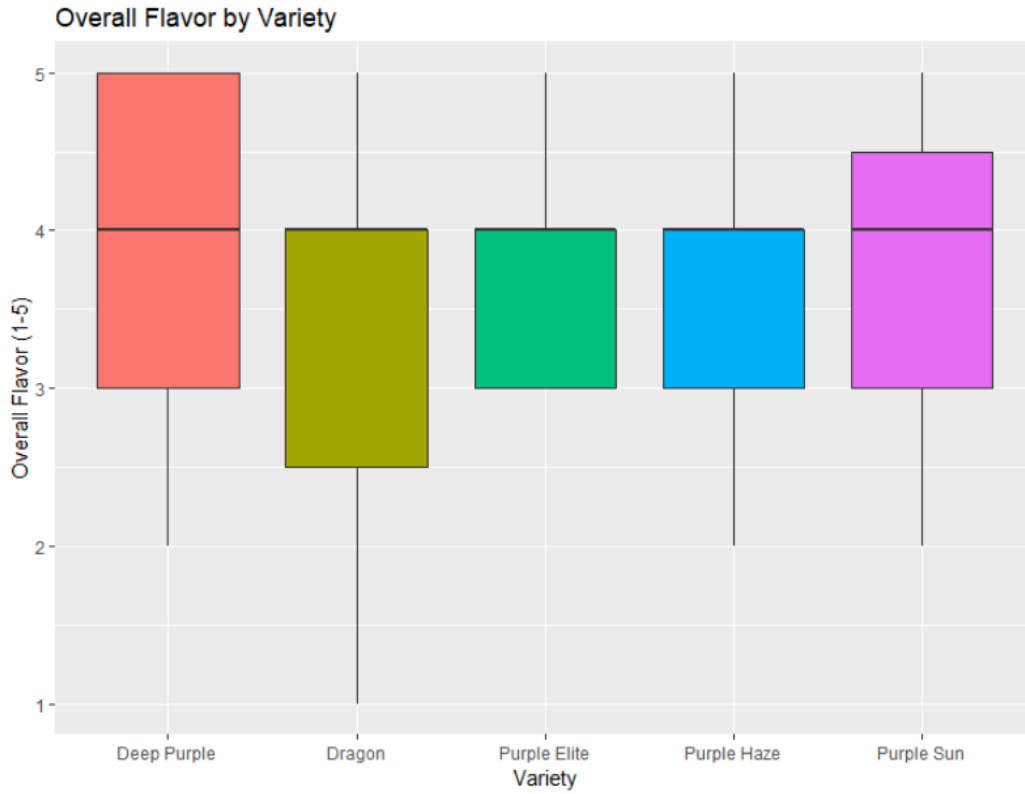


Purple carrot marketable weight

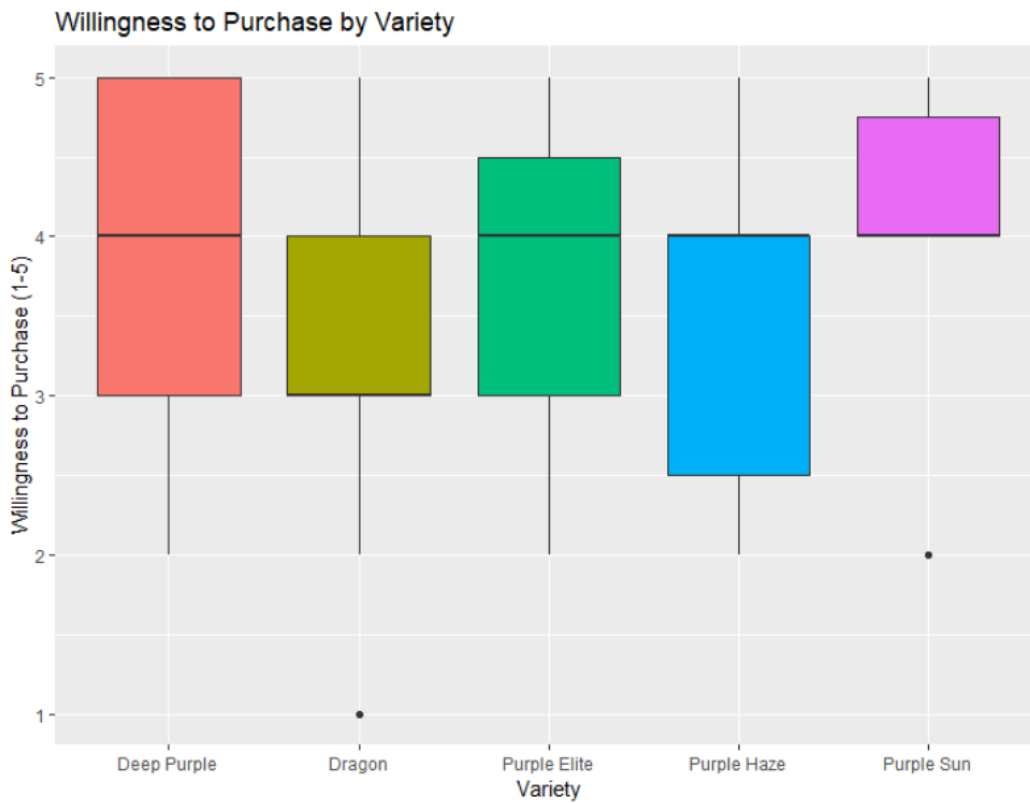


Purple carrot unmarketable proportion





Purple carrot overall flavor



Purple carrot willingness to purchase



Purple Carrots (field)

(* indicates varieties statistically similar to the “best” variety in each category shown in **BOLD**)

Variety	Total weight (lbs/plot)	Marketable Count (#/plot)	Marketable Weight (lbs/plot)	Unmarketable Proportion (%)	Overall Flavor (1-5)	Willingness to Purchase (1-5)
Deep Purple	12.03	35.00	7.42	37%	3.87	3.86*
Dragon	20.91	57.00*	15.52*	26%	3.27*	3.27*
Purple Elite	20.75*	60.00*	17.07	18%	3.60*	3.80*
Purple Haze	15.37	64.33	12.57	18%*	3.60*	3.47*
Purple Sun	10.70	39.67	7.27	32%	3.80*	4.00



2021 Asian Cucumber Variety Report

Seed to Kitchen Collaborative
Michigan State University
Upper Peninsula Research and Extension Center

Management

In 2021, six Asian cucumber varieties were trialed at the MSU Upper Peninsula Research and Extension Center in Chatham, MI. Cucumbers were seeded in the greenhouse April 29 into 2 inch soil blocks using Morgan Composting Dairy Doo Seed Starter 101 soil media, potted up to 4 in plastic pots on May 18, and transplanted into the hoop house June 2. Plots 3 ft wide x 7 ft long were laid out in a RCBD design with four replications. Fertility was applied just prior to planting, and consisted of a feather meal based 10-0-4 fertilizer from Morgan's Composting called Safe Green Lawn applied at 500 lbs/ac (0.011 lb/ft²). Plants were spaced 1 ft. apart in-row, with 1 row per bed, and trained to a single leader with plastic twine supported by tomato clips. Plants were pruned of suckers on a weekly basis starting June 21. Irrigation was provided 2 hrs weekly via one line of drip tape. To control cucumber beetles, Surround (kaolin clay) was applied weekly during the growing season, with Pyganic (pyrethrum) added as a tank-mix on June 21 and July 7. Weeds were controlled with hoeing and hand weeding. Cucumbers were harvested 1-2 times weekly June 29 – September 7.

Varieties tested:

	<u>Supplier</u>	<u>Variety</u>	<u>Market Class</u>	<u>Color</u>
	Fedco	Shintokiwa	Asian	Dark Green
	Kitazawa	Soarer	Asian	Dark Green
	Fedco	Suhyo Long	Asian	Dark Green
	High Mowing	Tasty Green	Asian	Dark Green
	USDA	WI7633	Breeding	Green & White Stripe
	USDA	WI7801	Breeding	Dark Green

Traits

Marketable Count, Marketable Weight (kg), Unmarketable Count, Unmarketable Weight (kg), Unmarketable (oversized) Count, Unmarketable (oversized), Proportion Unmarketable.



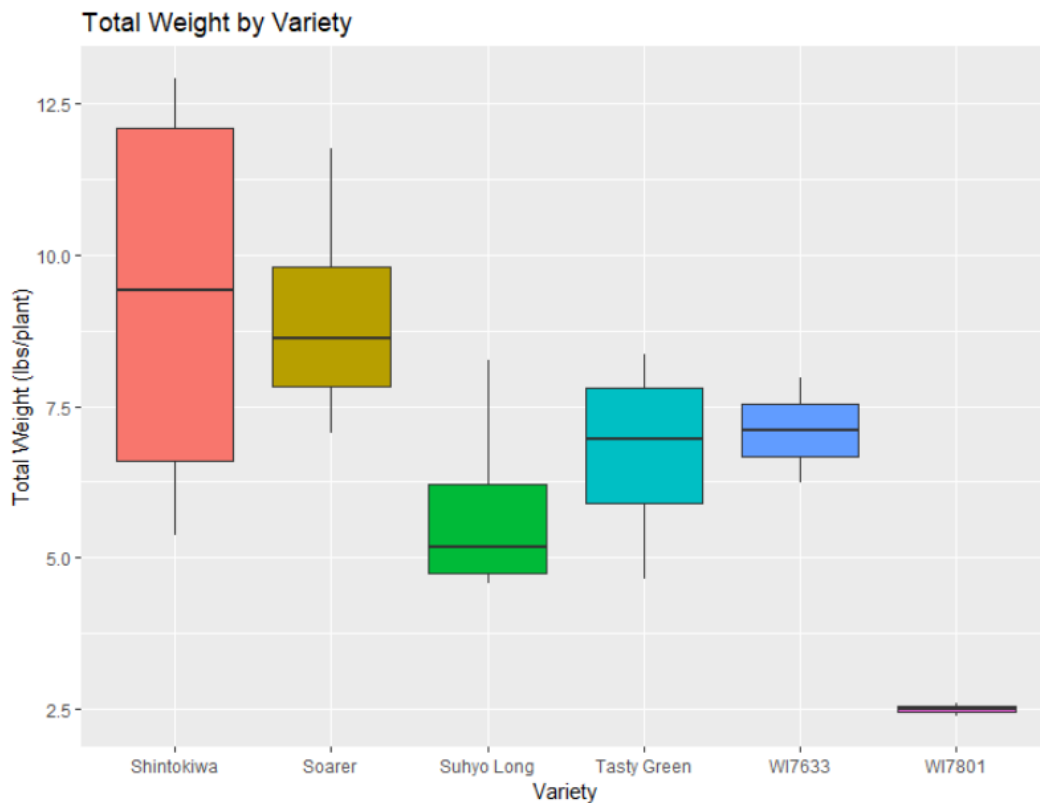
Notes on trait measurement:

Cucumbers faced heavy pressure from cucumber beetles and bacterial wilt. Resistant varieties performed best in 2021. Analysis was conducted at the per plant level.

Quality Evaluation

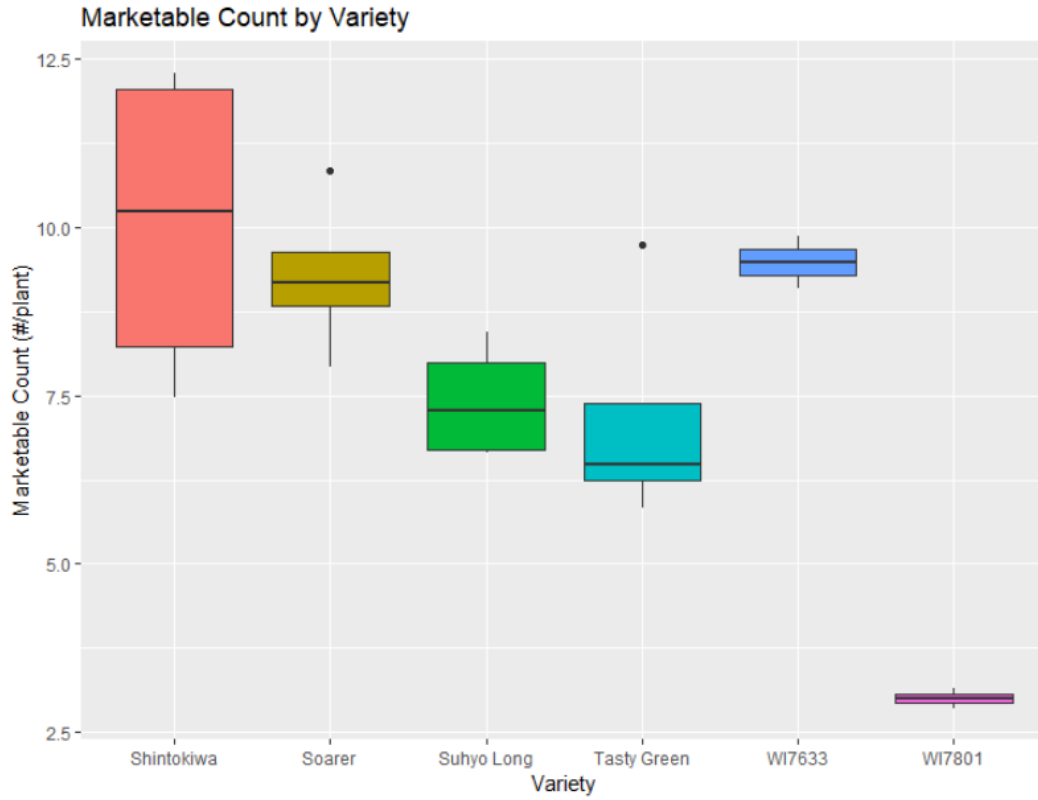
Chef taste testing:

Flavor evaluation was done by eight local chefs in the Marquette/Alger County area. Varieties were packed with an individual alphanumeric code (no variety names were included in boxes). Boxes were delivered to chefs, including instructions for evaluation and a QR code linking to Qualtrics where data was entered. Flavor intensity and complexity were rated on a scale of 1 (low) to 5 (high). Appearance, texture, and overall flavor were rated from 1 (poor) to 5 (excellent). Skin thickness was rated from 1 (thin) to 5 (thick). The likelihood that they would buy it for their restaurant (1=no way, 5=yes, definitely) and perceived ease of preparation (1=difficult, 5 = easy) were also rated.

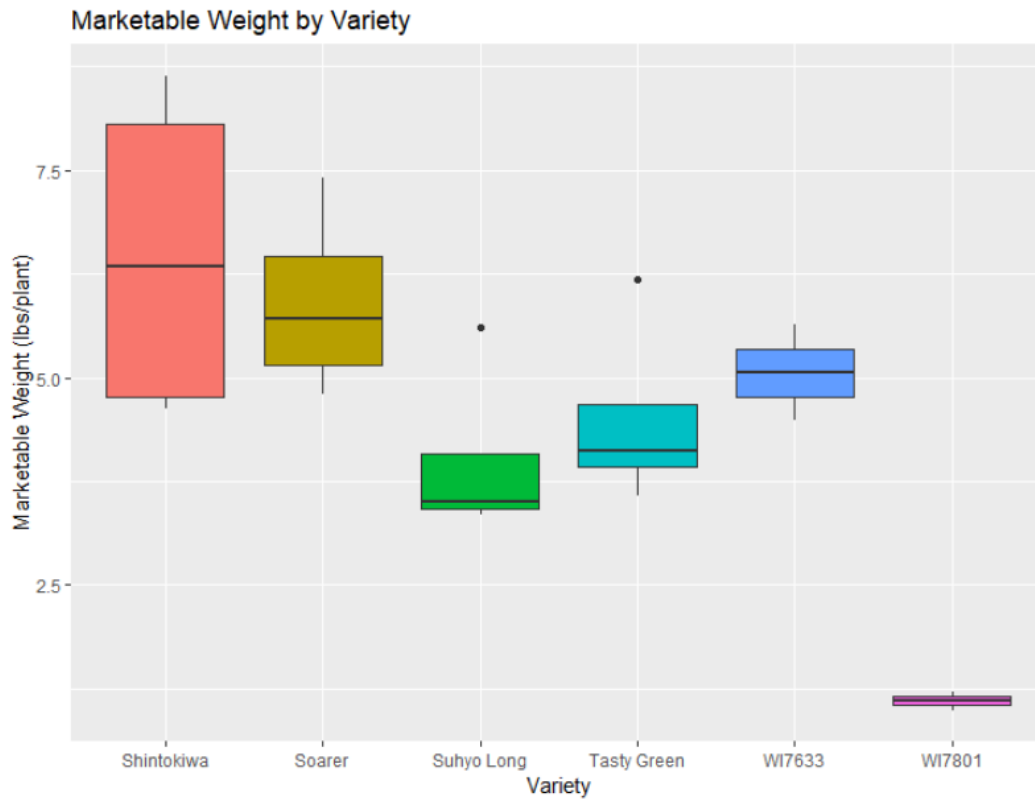


Cucumber total weight



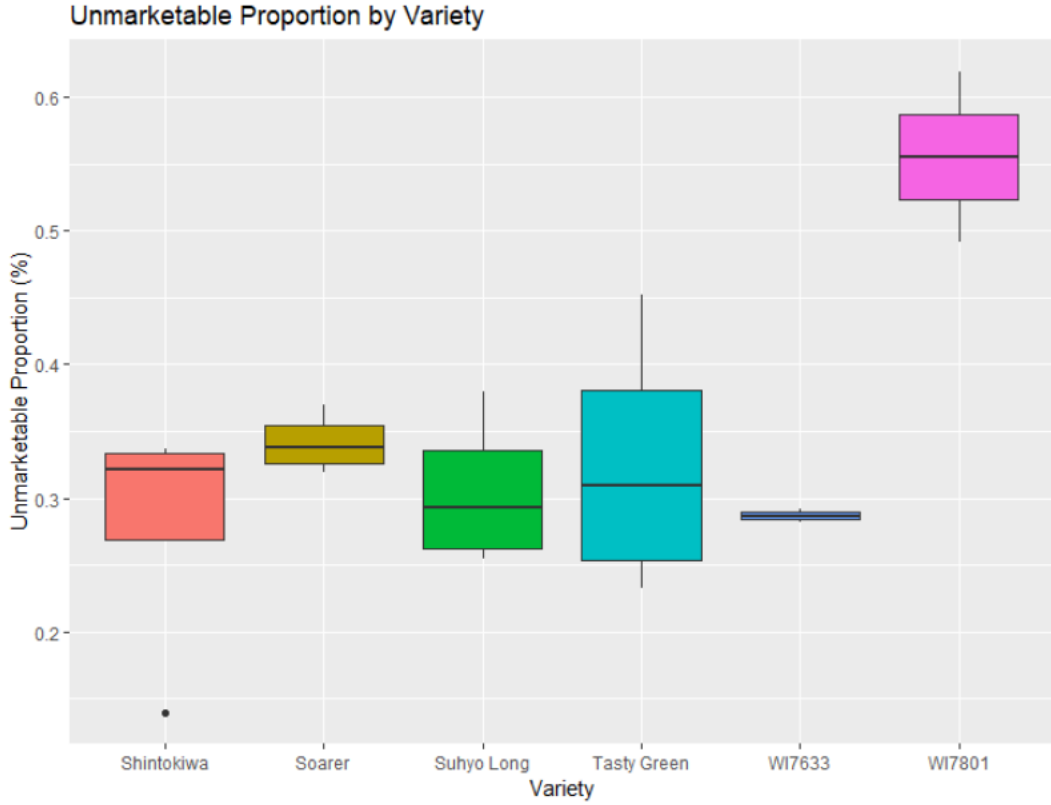


Cucumber marketable count

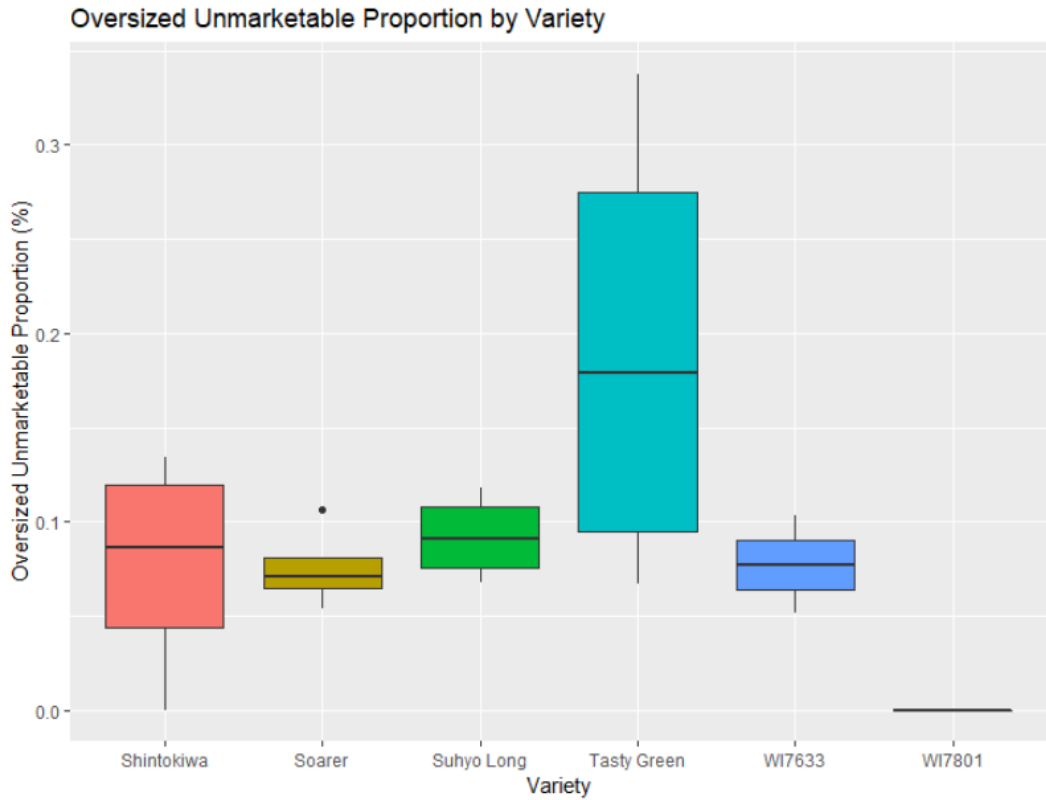


Cucumber marketable weight



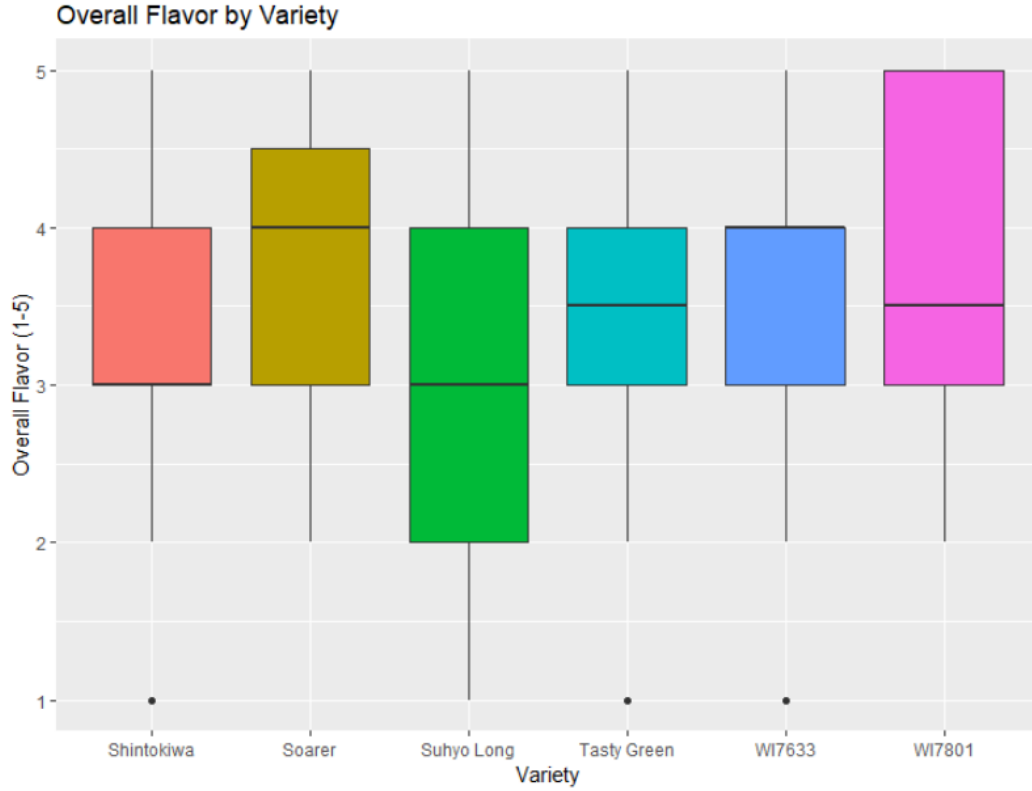


Cucumber total unmarketable proportion

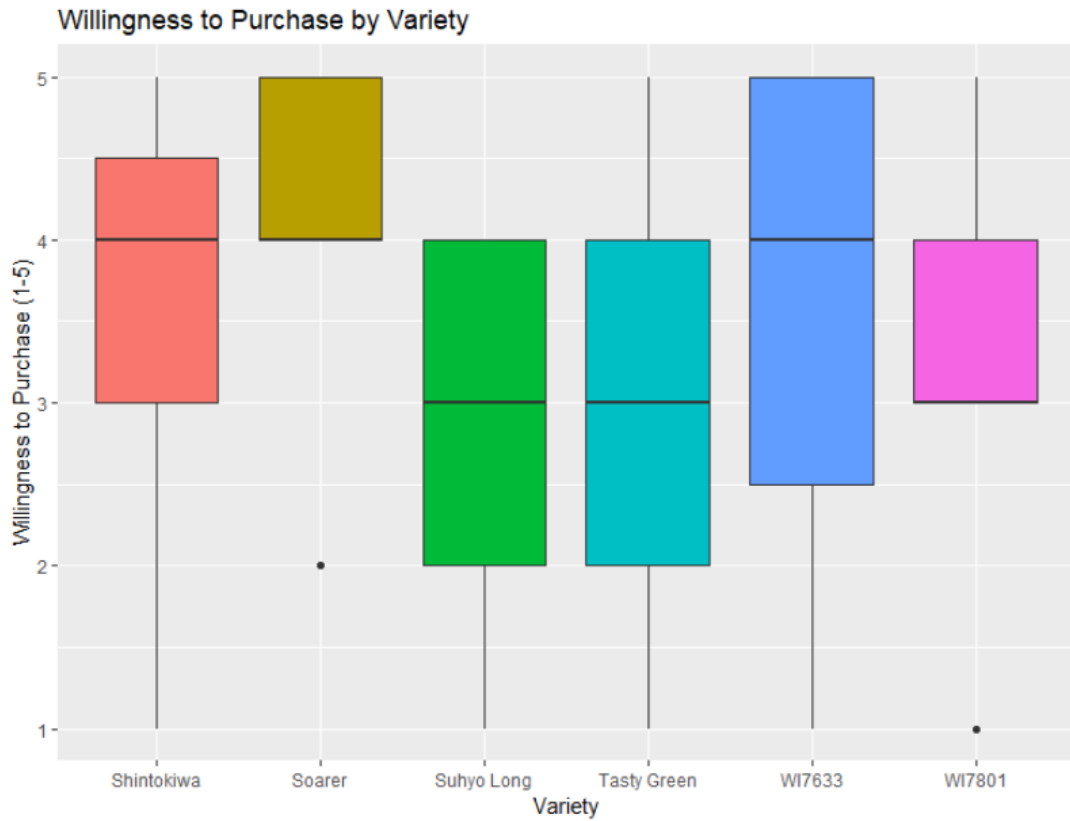


Cucumber oversize unmarketable proportion





Cucumber overall flavor



Cucumber willingness to purchase



Asian Cucumbers (high tunnel)

(* indicates varieties statistically similar to the “best” variety in each category shown in **BOLD**)

Variety	Total weight (lbs/plant)	Marketable Count (#/plant)	Marketable Weight (lbs/plant)	Unmarketable Proportion (%)	Overall Flavor (1-5)	Willingness to Purchase (1-5)
Shinto-kiwa	9.28	10.05	6.48	28%	3.30*	3.58*
Soarer	9.01*	9.28*	5.91*	34%*	3.79	4.11
Suhyo Long	5.79*	7.41*	3.99*	31%*	3.00*	2.89
Tasty Green	6.73*	7.13*	4.49*	33%*	3.39*	3.24*
WI7633	7.10*	9.48*	5.06*	29%*	3.70*	3.73*
WI7801	2.49	3.01	1.10	56%	3.70*	3.37*

