

2022 Vegetable Variety Trial Reports



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

Dr. James DeDecker and Sarah Hayward

<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 2022, the MSU Upper Peninsula Research and Extension Center (UPREC) received funding from MSU Project GREEN 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, led 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 31 different varieties of five vegetables in replicated variety trials including winter squash (Pg. 3), cantaloupe (Pg. 8), carrot (Pg. 13), broccoli (Pg. 22), and tomato (not reported). Our 2022 tomato trial was a participatory breeding project, which is not reported here. All trials used conventional rotary tillage and USDA organic production practices on land certified as organic by MOSA.

Temperature and precipitation were near normal at Chatham in 2022. All trials, except carrots, were exposed to moderate hail damage on July 1st. Independent 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 recruited nine local chefs, nutrition educators, farmers 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.

The sensory 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 tasters on Fridays. When tasters 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 'appearance', '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 2022 trials possible, including MSU Project GREEN, the Dr. Julie Dawson lab at UW-Madison, Sarah DeGraff, participating seed companies and breeders, Andy Bahrman, Marleigh Sherbinow, Cole Ferguson, Marquette Food Co-op, NMU Dining Services, Border Grill, Yoop Coop, Iron Bay Restaurant, Delft Bistro, Northwoods Test Kitchen at Barrel + Beam, MARESA, Teaching Family Homes, and others!



2022 Winter Squash Variety Report

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Management

In 2022, five Kabocha (*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 21 into 1.5" inch soil blocks using Morgan Composting Dairy Doo Seed Starter 101 media. Plants were then potted-up to 4 inch plastic pots on May 24, and transplanted into the field June 8. Plots 3 ft wide x 12 ft long were laid out on raised beds in a RCBD design with four replications. Fertility was applied prior to planting and consisted of 13-0-0 feather meal applied at 800 lbs/ac (0.018 lbs/ft²). Plants were spaced 2 ft. apart in-row, with 1 row per bed and 9 ft between beds. Irrigation was provided as needed via a single line of drip tape. To control cucumber beetles, Surround (kaolin clay) was applied once during the growing season on July 6. Weeds were controlled by black plastic mulch, crimson clover and buckwheat between beds, mowing and hand weeding. Squash was harvested September 15.

Varieties Tested:

		<u>Treatment #</u>	<u>Breeder</u>	<u>Variety</u>	<u>Market Class</u>	<u>Color</u>
1		1	NA	Bluebell	Kabocha	Slate blue
	2	2	Johnny's	JWS 16-42-52	Kabocha	Orange
		3	Johnny's	Sweet Jade	Kabocha	Dark green
	4	4	Johnny's	Winter Blush	Kabocha	Pale orange
		5	Earthwork	Winter Sweet	Kabocha	Slate blue

Field Traits

Marketable Count, Marketable Weight (lbs), Unmarketable Count, and Proportion Unmarketable were measured. Unmarketable Weight (lbs) was estimated using Unmarketable Count and average Marketable Weight. Harvest was completed in a single day at the end of the season once vines had begun to senesce. Fruits were weighed and graded the day of harvest. Analysis was conducted at the per plant level.



Quality Evaluation

Sensory evaluation was completed by chefs, food retailers and nutrition educators in Marquette, MI. Varieties were packed with individual alphanumeric codes. Boxes were delivered to tasters, including instructions for evaluation and a link to a Qualtrics survey 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.

Results

Data were analyzed using ANOVA and Tukey's HSD test in the Agricolae package for R at alpha = 0.05. Plants were exposed to moderate hail damage on July 1. Significant differences between varieties were observed in total weight, marketable count, marketable weight, appearance and willingness to purchase. Rodent damage and small size were the primary reasons fruits were deemed unmarketable. Bluebell, JWS 16-42-52, Winter Blush and Winter Sweet yielded especially well. Bluebell, JWS 16-42-52 and Winter Sweet showed above-average flavor and marketability. Additional data on these and other squash varieties can be found at Seedlinked.com.

Winter Squash Performance at Chatham, MI (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)	Appearance (1-5)	Overall Flavor (1-5)	Willingness to Purchase (1-5)
Bluebell	16.87	2.38	11.79*	4.69	4.00	4.06*
JWS 16-42-52	14.76*	4.04*	11.54*	4.31*	3.38*	3.50*
Sweet Jade	10.67	5.25	7.76	4.25*	3.88*	3.19
Winter Blush	14.68*	3.12	12.22	4.00	3.38*	3.13
Winter Sweet	13.86*	2.54	11.16*	4.44*	4.00	4.27
Average	14.17	3.47	10.89	4.34	3.73	3.62











2022 Broccoli Variety Report

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Management

In 2022, five spring and five summer broccoli varieties (some dual purpose) were trialed at the MSU Upper Peninsula Research and Extension Center in Chatham, MI. Broccoli was seeded in the greenhouse April 21 (spring) and June 1 (summer) into 72-cell plastic trays using Morgan Composting Dairy Doo Seed Starter 101 media, and transplanted into raised beds outdoors May 23 (spring) and June 28 (summer). Plots 3 ft wide x 4.5 ft long were laid out on raised beds in a RCBD design with four replications. Fertility was applied prior to planting, and consisted of a poultry-based 10-0-4 fertilizer from Morgan's Composting called Safe Green Lawn applied at 1,400 lbs/ac (0.032 lb/ft²). Six plants were spaced 18 inches apart in-row, with 2 staggered rows per plot. Irrigation was provided as needed via a single line of drip tape. Weeds were controlled by black plastic mulch, crimson clover and buckwheat between beds, mowing and hand weeding. Broccoli was harvested July 4 – August 4 (spring) and August 4 – August 28 (summer).

Varieties Tested

		<u>Treatment #</u>	<u>Breeder</u>	<u>Variety</u>	<u>Market Class</u>
		1	Bayer	Abrams	Summer
		2	Bejo	Belstar	Spring
		3	Bayer	Castle Dome	Spring/Summer
		4	Bejo	Covina	Spring
		5	Sakata	Green Magic	Spring/Summer
		6	Sakata	Gypsy	Spring
		7	Sakata	Imperial	Summer
		8	HM Clause	Luna	Summer

Field Traits

Vigor (1-5), Disease Resistance (1-5), Earliness (1-5), Total Marketable Weight (lbs), Marketable Crown Count, Marketable Crown Weight (lbs), Unmarketable Weight (lbs), and Proportion Unmarketable were measured. Analysis was conducted at the per plant level.



Quality Evaluation

Sensory evaluation was completed by chefs, food retailers and nutrition educators in Marquette, MI. Varieties were packed with individual alphanumeric codes. Boxes were delivered to tasters, including instructions for evaluation and a link to a Qualtrics survey where data was entered. Broccoli was tasted raw. 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.

Results

Data were analyzed using ANOVA and Tukey's HSD test in the Agricolae package for R at alpha = 0.05. Spring and summer trials were analyzed together. Plants were exposed to moderate hail damage on July 1. Spring varieties yielded significantly more than summer varieties. Significant differences between varieties were observed in total weight, crown weight and appearance. Hail damage on July 1, over and under maturity were the primary reasons heads were deemed unmarketable. Gypsy and Castle Dome yielded especially well. Castle Dome, Green Magic and Luna showed above-average flavor and marketability. Additional data on these and other broccoli varieties can be found at Seedlinked.com.

Broccoli Performance at Chatham, MI (field)

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

Variety	Total Weight (lbs/plant)	Crown Weight (lbs/plant)	Unmarketable Proportion (%)	Appearance (1-5)	Overall Flavor (1-5)	Willingness to Purchase (1-5)
Abrams	0.43	0.40	5.73*	4.00*	3.43*	3.14*
Belstar	0.52*	0.45	9.46*	3.75*	3.50*	3.60*
Castle Dome	0.81*	0.63	19.23*	4.15*	3.96*	4.04
Covina	0.58*	0.45	14.83*	3.85*	2.85*	3.05*
Green Magic	0.61*	0.49	17.31*	4.59*	3.81*	3.96*
Gypsy	0.95	0.93	2.68	3.20	3.30*	3.05*
Imperial	0.42	0.39	5.63*	4.86	3.43*	3.29*
Luna	0.57*	0.48	14.79*	4.29*	4.14	3.57*
Average	0.63	0.53	12.62	4.03	3.56	3.56









2022 Carrot Variety Report

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Management

In 2022, six orange carrot varieties were trialed at the MSU Upper Peninsula Research and Extension Center in Chatham, MI. Plots 3.33 ft wide x 8 ft long were laid out in a RCBD design with 4 replications. Prior to planting, a cover crop of buckwheat was seeded in the field May 20 and terminated with tillage on June 30. Fertility was applied just prior to planting, and consisted of a poultry-based 10-0-4 fertilizer from Morgan's Composting called Safe Green Lawn applied at 1000 lbs/ac (0.022 lb/ft²). Raw carrot seed was direct-seeded in 4 rows per plot (8 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), hoeing and hand weeding. Carrots were harvested October 3.

Varieties Tested

	<u>Breeder</u>	<u>Variety</u>	<u>Market Class</u>	<u>Color</u>
	Vilmorin	Bolero	Nantes	Orange
	Bejo	Napoli	Nantes	Orange
	Bejo	Narvik	Nantes	Orange
	Bejo	Negovia	Nantes	Orange
	BASF	Romance	Nantes	Orange
	Bejo	Yaya	Nantes	Orange

Field Traits

Marketable Count, Marketable Weight (lbs), Unmarketable Weight (lbs), Top Height (cm), and Proportion Unmarketable were measured. Top height was measured before harvest at three points in each plot and averaged. Analysis was conducted at the plot level.

Quality Evaluation

Sensory evaluation was completed by chefs, food retailers and nutrition educators in Marquette, MI. Varieties were packed with individual alphanumeric codes. Boxes were



delivered to tasters, including instructions for evaluation and a link to a Qualtrics survey where data was entered. Carrots were tasted raw. 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.

Results

Data were analyzed using ANOVA and Tukey's HSD test in the Agricolae package for R at alpha = 0.05. Significant differences between varieties were observed in marketable weight and average root size only. Differences in willingness to purchase were nearly significant at P = 0.21, but the sensory sample for carrots was small. Small size and forked roots were the primary reasons that carrots were deemed unmarketable. Bolero, Romance and Napoli yielded especially well. Bolero, Napoli, Narvik and Romance showed above-average flavor and marketability. Additional data on these and other carrot varieties can be found at Seedlinked.com.

Orange Carrot Performance at Chatham, MI (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)	Appearance (1-5)	Overall Flavor (1-5)	Willingness to Purchase (1-5)
Bolero	25.25*	138.00*	22.50	4.63*	3.38*	3.63*
Napoli	27.13	139.25*	21.88*	4.63*	3.63*	3.50*
Narvik	21.88*	110.50*	13.50	4.25*	3.75*	4.13
Negovia	23.00*	127.00*	18.00*	4.38*	3.38*	3.25*
Romance	25.38*	143.25	22.38*	4.75	3.88	4.13
Yaya	25.75*	122.75*	20.13*	4.63*	3.25*	3.50*
Average	24.73	130.13	19.73	4.54	3.54	3.69






2022 Cantaloupe Variety Report

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Management

In 2022, three cantaloupe varieties were trialed at the MSU Upper Peninsula Research and Extension Center in Chatham, MI. Melons were seeded in the greenhouse May 21 into 1.5” soil blocks using Morgan Composting Dairy Doo Seed Starter 101 media. Plants were then potted-up to 4 inch plastic pots on May 24, and transplanted into raised beds outdoors June 20. Plots 3 ft wide x 9 ft long were laid out on raised beds in a RCBD design with four replications. Fertility was applied prior to planting, and consisted of a poultry-based 10-0-4 fertilizer from Morgan’s Composting called Safe Green Lawn applied at 1,400 lbs/ac (0.032 lb/ft²). Six plants were spaced 18 inches apart in-row, with 1 row per plot, and covered with perforated plastic row cover for 2 weeks. Irrigation was provided as needed via a single line of drip tape. Weeds were controlled by black plastic mulch, crimson clover and buckwheat between beds, mowing and hand weeding. Melons were harvested August 22 through September 8, based on maturity.

Varieties Tested:

	<u>Treatment #</u>	<u>Breeder</u>	<u>Variety</u>	<u>Market Class</u>
	1	Vitalis	Divergent	Cantaloupe
	2	Earthwork	Triton	Cantaloupe
	3	Univ. of NH	True Love	Cantaloupe

Field Traits

Marketable Count, Marketable Weight (lbs), Unmarketable Count, Unmarketable Weight (lbs), and Proportion Unmarketable were measured. Melons faced significant rodent damage during ripening. Analysis was conducted at the per plant level.

Quality Evaluation

Sensory evaluation was completed by chefs, food retailers and nutrition educators in Marquette, MI. Varieties were packed with individual alphanumeric codes. Boxes were delivered to tasters, including instructions for evaluation and a link to a Qualtrics survey where data was entered. Melons were tasted raw. 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.

Results

Data were analyzed using ANOVA and Tukey's HSD test in the Agricolae package for R at alpha = 0.05. Plants were exposed to moderate hail damage on July 1. No significant differences between varieties were observed. Differences in flavor and willingness to purchase were nearly significant at P = 0.23-0.25, but the sensory sample for melons was small. Rodent damage was the primary reason that melons were deemed unmarketable, and it likely also confounded variety differences. Divergent and True Love yielded well, but were also preferred by rodents. Divergent showed above average flavor and marketability. Additional data on these and other melon varieties can be found at Seedlinked.com.

Cantaloupe Performance at Chatham, MI

(* 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)	Appearance (1-5)	Overall Flavor (1-5)	Willingness to Purchase (1-5)
Divergent	12.13	1.88*	6.77*	4.44*	4.11	4.22
Triton	9.45*	2.08	7.22	4.67	4.00*	4.00*
True Love	11.50*	1.96*	6.75*	4.56*	3.33*	3.33*
Average	11.02	1.97	6.91	4.56	3.81	3.85

