

# Report to the Pennsylvania Vegetable Research and Marketing Board

## Spring and Fall Cabbage Cultivar Demonstration During COVID-19

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Selecting which cultivar to grow is critical to successful vegetable production. When a cultivar is suited to an area and has high yield and quality for the market it is grown for, growers can make a profit. However, because numerous cultivars are commercially available, it can be difficult to select the best ones. In 2020-21 we evaluated up to 21 cultivars of spring and fall cabbage in western, central, and southeastern Pennsylvania to provide growers with up-to-date science-based information for successful, region-specific cultivar selection.

**Methods:** The study was conducted in central Pennsylvania at Pennsylvania State University's Russell E. Larson Research Center in Rock Springs, in southeastern Pennsylvania State University's Southeast Research and Extension Center in Manheim and western Pennsylvania at Yarnick's Farm.

Six- to eight-week-old transplants were planted in mid- to late March or early April for the spring crop and in early August to mid-August for the fall crop. The exact planting date varied by site. A plasticulture system consisting of black plastic mulch and drip irrigation was used at for the spring and fall crops in central and southeastern sites and the spring crop at the western site. A system using raised beds without plastic was used for the fall crop at the western site. Plots consisted of 6 plants in a staggered double row with 1 ft in-row spacing and 6 ft between rows. Plants were provided with 1-1.5 acre-inches of water each week. Pests and fertility were managed following recommendations in the 2020/2021 Commercial Vegetable Production Recommendations guide and varied by conditions at each site.

Heads were harvested when they reach maturity: when heads were tight and had reached the desired size. At that time heads were categorized as marketable or unmarketable, counted, and weighed. We also determined maximum head and core height and width. In general, cultivars with no data collected in the fall were because they were not able to mature due to shorter days and cold weather. In the spring trial at the western site, non-harvested plots were due to wet conditions in the low part of the field.

A randomized complete block design was used with each cultivar replicated four times. Data was collected from 5 plants per cultivar per replication. Data were analyzed using the mixed procedure and means were separated using pdiff.

## Results:

### *Western Pennsylvania*

'Checkmate' was used as the standard at the Western site.

In the Fall of 2020, 'Checkmate' heads were significantly heavier than 'Ramada' heads and not different in mean weight than all other cultivars (Table 1). Mean head height and width were not significantly different between cultivars. 'Xtreme Vantage' heads had longer cores than 'Checkmate'. All other cultivars were not different than 'Checkmate'. 'Bravo' heads had wider mean core widths than 'Checkmate'. All other cultivars were not different than 'Checkmate'.

In the Spring of 2021, the mean head weight of 'Checkmate' was not different than all other cultivars. 'Gunma' had significantly shorter heads than 'Checkmate'. All other cultivars were not different than 'Checkmate'. 'Platinum Dynasty' had a smaller mean head width than 'Checkmate'. All other cultivars were not different than 'Checkmate'. The mean

core heights of all cultivars were not different than 'Checkmate'. 'Bronco' had a wider mean core width than 'Checkmate'. All other cultivars were not different than 'Checkmate'.

**Table 1.** Yield and head characteristics of cabbage cultivars grown in Western Pennsylvania in the fall growing season of 2020 and the spring growing season of 2021.

Cultivar	Fall 2020					Spring 2021				
	Mean marketable weight (lb)	Mean head height (cm)	Mean head width (cm)	Mean core height (cm)	Mean core width (cm)	Mean marketable weight (lb)	Mean head height (cm)	Mean head width (cm)	Mean core height (cm)	Mean core width (cm)
SSR-GC-301	3.75 a*	15.12 a	17.23 a	6.92 bc	2.80 b	-	-	-	-	-
<b>Checkmate</b>	<b>3.37 ab</b>	<b>15.88 a</b>	<b>16.71 a</b>	<b>6.65 bc</b>	<b>2.28 b</b>	<b>4.35 a</b>	<b>16.74 a</b>	<b>16.73 ab</b>	<b>8.10 a</b>	<b>3.00 b</b>
Xtreme Vantage	3.09 a-c	16.11 a	17.30 a	8.10 a	2.85 ab	-	-	-	-	-
Tiara	3.07 a-c	15.71 a	15.18 a	6.71 bc	2.82 b	3.59 a	16.47 a	14.90 b	6.52 ab	2.99 b
Artost	3.02 a-c	14.74 a	15.56 a	5.84 c	2.88 ab	3.52 a	15.95 ab	15.21 b	6.51 ab	3.16 ab
Bravo	2.91 a-c	14.13 a	16.67 a	6.94 a-c	3.19 a	-	-	-	-	-
Farao	2.77 a-c	15.28 a	14.75 a	6.73 bc	2.85 ab	-	-	-	-	-
Platinum Dynasty	2.59 bc	14.75 a	14.83 a	7.04 ab	2.79 b	3.48 a	16.27 ab	15.07 b	5.89 b	3.21 ab
Ramada	2.06 c	13.80 a	14.75 a	6.12 bc	2.91 ab	-	-	-	-	-
Gunma	-	-	-	-	-	3.87 a	13.28 b	20.42 a	7.25 ab	3.10 b
Bajonet	-	-	-	-	-	3.86 a	16.94 a	15.77 b	7.76 a	3.08 b
Bronco	-	-	-	-	-	3.56 a	16.81 a	14.87 b	7.57 ab	3.58 a

\*Values are means for individual heads; 'Checkmate' (bolded) is the standard to which all other cultivars were compared; Values in the green text within a column are significantly larger than 'Checkmate', values in the red text within a column are significantly smaller than 'Checkmate'; "-" indicates data was not collected from the cultivar during the corresponding season.

### Central Pennsylvania

'Bravo' was used as the standard cultivar.

In the Fall of 2020, 'Capture' produced heavier heads than 'Bravo' (Table 2). 'Blue Vantage', 'Farao', 'Ramada', 'Thunderhead', 'SSR-GC-301', 'Gunma', and 'B-3269' produced lighter heads than 'Bravo'. All other cultivars were not different than 'Bravo'. 'Checkmate' and 'Bajonet' produced taller heads and 'SSR-GC-301' shorter heads than 'Bravo'. All other cultivars were not different than 'Bravo'. 'Platinum Dynasty', 'Blue Vantage', 'Farao', 'B-3269', 'Thunderhead', and 'Ramada' produced heads with smaller mean widths than 'Bravo'. All other cultivars were not different than 'Bravo'. 'Platinum Dynasty', 'Farao', 'Gunma', 'Ramada', 'Capture', 'Blue Vantage', 'SSR-GC-301', and 'Thunderhead' heads had

shorter mean core heights than 'Bravo'. All other cultivars were not different than 'Bravo'. 'Grand Vantage' and 'Bajonet' heads had a mean core width that was not different than 'Bravo'. All other cultivars had a mean core width that was smaller than 'Bravo'.

In the Spring of 2021, 'Thunderhead', 'Bronco', 'Capture', 'Artost', 'Zacapa', 'Farao', and 'Tiara' heads weighed less than 'Bravo' heads. All other cultivars were not different than 'Bravo'. 'Farao', 'Gumna', 'SRR-GC-301', 'Tiara', and 'Zacapa' heads were shorter than 'Bravo' heads. All other cultivars were not different than 'Bravo'. 'Thunderhead', 'Bronco', 'Ramada', 'Zacapa', 'Artost', 'Superstar', 'Farao', and 'Tiara' heads had smaller mean widths than 'Bravo'. All other cultivars were not different than 'Bravo'. 'Superstar', 'Capture', and 'Tiara' heads had shorter mean cores than 'Bravo'. All other cultivars were not different than 'Bravo'. 'Checkmate', 'SRR-GC-301', 'Thunderhead', 'Farao', and 'Tiara' heads had cores with smaller mean widths than 'Bravo'. All other cultivars were not different than 'Bravo'.

**Table 2.** Yield and head characteristics of cabbage cultivars grown in Central Pennsylvania in the fall growing season of 2020 and the spring growing season of 2021.

Cultivar	Fall 2020					Spring 2021				
	Mean marketable weight (lb)	Mean head height (cm)	Mean head width (cm)	Mean core height (cm)	Mean core width (cm)	Mean marketable weight (lb)	Mean head height (cm)	Mean head width (cm)	Mean core height (cm)	Mean core width (cm)
Capture	5.27 a*	17.28 ab	18.67 ab	5.32 c-e	3.43 c-e	3.46 b-e	14.87 b-e	17.10 b-d	5.61 e	4.53 a-e
Checkmate	4.80 ab	17.96 a	18.69 ab	6.07 a-c	3.82 b-d	3.62 a-e	15.41 a-e	16.89 b-e	7.83 ab	4.17 c-f
Superstar	4.68 a-c	17.03 ab	17.58 b-d	5.90 a-d	3.73 b-d	3.63 a-e	16.07 a-d	15.79 c-e	5.85 de	4.85 a
<b>Bravo</b>	<b>4.35 b-d</b>	<b>15.86 b-e</b>	<b>18.63 ab</b>	<b>6.78 ab</b>	<b>4.45 a</b>	<b>5.36 a</b>	<b>16.69 a-c</b>	<b>19.88 ab</b>	<b>7.29 a-c</b>	<b>4.70 ab</b>
Grand Vantage	4.18 b-e	15.11 c-e	17.27 b-e	6.14 a-c	4.15 ab	4.19 a-d	15.69 a-d	16.93 b-e	6.05 c-e	4.73 ab
Bajonet	1.16 b-e	17.89 a	17.25 b-e	6.88 a	3.93 a-c	4.64 a-c	16.97 ab	17.82 b-d	8.09 a	4.49 a-e
Artost	3.99 c-f	16.33 bc	17.75 bc	5.83 b-d	3.68 b-d	3.10 c-e	14.49 c-e	15.83 c-e	6.24 c-e	4.30 b-f
Platinum Dynasty	3.64 d-g	14.45 c-d	16.47 c-f	5.60 c-e	3.86 bc	4.00 a-d	15.40 a-e	17.16 b-d	6.07 c-e	4.52 a-e
Tiara	3.57 d-h	15.93 b-e	17.01 b-e	5.79 b-d	3.25 de	2.03 e	13.88 de	13.95 e	5.56 e	3.51 g
Blue Vantage	3.40 e-h	16.19 c-d	16.35 c-f	5.05 de	3.44 c-e	4.04 a-d	15.55 a-d	17.71 b-d	7.05 a-d	4.54 a-e
Farao	3.35 f-h	15.43 c-e	16.17 c-f	5.38 c-e	3.27 de	2.79 de	14.30 de	14.86 de	5.97 c-e	3.84 fg
Ramada	3.08gh	14.84 de	15.14 f	5.37 c-e	3.78 b-d	3.83 a-e	15.35 b-e	16.44 c-e	6.52 b-e	4.83 a
Thunderhead	2.95 g-i	14.52 e	15.53 ef	4.58 e	3.45 c-e	3.51 b-e	15.61 a-d	16.66 c-e	6.02 c-e	4.10 ef
SSR-GC-301	2.91 g-i	12.72 f	18.36 b	4.60 e	3.59 b-d	5.17 ab	14.07 de	21.30 a	6.42 b-e	4.14 d-f
Gunma	2.78 hi	15.14 c-e	20.32 a	5.37 c-e	3.55 cd	4.04 a-d	14.18 de	21.43 a	6.21 c-e	4.48 a-e

B-3269	<b>2.17 i</b>	15.90 b-e	<b>15.91</b> d-f	5.98 a- d	<b>2.94 e</b>	3.72 a-e	16.02 a-d	16.96 b-d	6.85 a- e	4.66 a- c
Botran	-	-	-	-	-	4.50 a-d	17.66 a	18.62 a-c	6.60 b- e	4.55 a- e
Xtreme Vantage	-	-	-	-	-	4.40 a-d	16.03 a-d	18.73 a-c	6.70 b- e	4.59 a- d
Bronco	-	-	-	-	-	<b>3.50 b-e</b>	15.63 a-d	<b>16.50</b> c-e	6.69 b- e	4.89 a
Conqueror	-	-	-	-	-	4.27 a-d	15.98 a-d	17.85 b-d	6.50 b- e	4.77 ab
Zacapa	-	-	-	-	-	<b>2.95 c-e</b>	<b>13.11</b> e	<b>15.85</b> c-e	5.97 c- e	4.77 ab

\*Values are means for individual heads; 'Bravo' (bolded) is the standard to which all other cultivars were compared; Values in the green text within a column are significantly larger than 'Bravo', values in the red text within a column are significantly smaller than 'Bravo'; "-" indicates data was not collected from the cultivar during the corresponding season.

### Southeastern Site

'Bravo' was used as the standard cultivar.

In the Spring of 2021, 'Conqueror', 'Tiara', and 'Checkmate' produced heavier heads than 'Bravo'. All other cultivars were not different than 'Bravo'. 'Botran', 'Bajonet', 'Tiara', 'Blue Vantage', 'Superstar', 'Xtreme Vantage', 'Checkmate', 'Farao', and 'Conqueror' produced heavier heads than 'Bravo' while 'SRR-GC-301' and 'Gunma' produced lighter heads. All other cultivars were not different than 'Bravo'. 'Bajonet' produced wider heads and 'Superstar', 'Tiara', 'Farao', and 'SRR-GC-301' narrower heads than 'Bravo'. All other cultivars were not different than 'Bravo'. 'Gunma' produced taller cores than 'Bravo'. 'Thunderhead', 'Farao', 'Platinum Dynasty', 'Artost', 'Bajonet', 'Tiara', 'Botran', 'Ramada', 'Grand Vantage', 'Blue Vantage', 'Bronco', 'B-3269', 'Zacapa', and 'Superstar' produced heads with cores that were shorter than 'Bravo'. All other cultivars were not different than 'Bravo'. All cultivars were not different than 'Bravo' in terms of mean core width.

**Table 3.** Yield and head characteristics of cabbage cultivars grown in Southeastern Pennsylvania in the spring growing season of 2021.

Cultivar	Spring 2021					Fall 2021				
	Mean marketable weight (lb)	Mean head height (cm)	Mean head width (cm)	Mean core height (cm)	Mean core width (cm)	Mean marketable weight (lb)	Mean head height (cm)	Mean head width (cm)	Mean core height (cm)	Mean core width (cm)
Conqueror	3.16 a*	14.93 b-d	15.60 cd	6.45 d-g	3.07 a-c	3.02 a-e	16.67 b	14.15 d-f	7.02 a-f	2.88 bc
Tiara	3.16 a	15.35 ab	14.73 e-i	6.10 fg	2.91 a-c	2.73 e	14.86 e-i	14.67 a-e	6.72 c-f	2.36 hi
Checkmate	3.16 a	14.99 b-d	15.39 c-e	7.00 b-f	3.00 a-c	3.17 a-c	15.95 b-d	15.09 a-c	7.01 a-f	2.58 d-g
Botran	3.09 ab	15.94 a	14.60 f-j	6.62 c-g	2.90 a-c	3.02 a-e	15.63 c-g	15.24 ab	7.16 a-e	2.39 g-i
Xtreme Vantage	3.05 a-c	15.05 b-d	15.15 c-f	7.14 b-e	3.16 a-c	2.88 c-e	16.62 bc	13.76 f-h	7.32 a-e	2.71 b-d
Farao	3.04 a-c	14.97 b-d	14.80 e-h	6.02 g	2.95 a-c	2.82 de	15.63 c-g	14.40 c-f	6.27 e-g	2.54 d-h
Artost	3.02 a-c	14.59 c-e	14.77 e-h	6.57 c-g	3.21 ab	2.92 b-e	15.99 b-d	14.01 e-g	6.58 c-f	2.64 de

SRR-GC-301	3.01 a-c	12.99 gh	16.47 b	4.79 h	2.88 bc	2.94 b-e	18.31 a	11.14 j	5.32 g	2.54 d-h
Platinum Dynasty	2.95 a-c	14.45 de	14.78 e-h	7.73 ab	3.31 ab	2.96 a-e	15.34 d-h	13.92 e-h	5.93 fg	2.62 d-f
Blue Vantage	2.95 a-c	15.26 b	14.12 h-k	6.32 e-g	3.23 ab	2.94 a-e	15.76 b-f	14.34 c-f	6.27 e-g	2.54 d-h
Bronco	2.94 a-b	14.55 c-e	14.02 i-k	7.12 b-e	3.29 ab	2.91 b-e	14.52 hi	14.86 a-d	6.93 b-f	2.88 bc
Bajonet	2.91 a-c	15.55 ab	14.75 e-i	8.60 a	3.12 a-c	2.86 de	14.77 f-i	15.38 a	8.05 a	2.48 e-h
Capture	2.91 a-c	14.07 ef	15.82 bc	7.48 bc	3.08 a-c	2.83 de	15.81 b-e	13.36 gh	7.25 a-e	2.53 d-h
Superstar	2.90 a-c	15.09 bc	13.64 k	6.11 fg	3.08 a-c	3.24 a	14.84 e-i	15.34 ab	6.70 c-f	2.69 cd
Ramada	2.90 a-c	14.05 ef	14.25 g-k	7.37 b-d	3.01 a-c	3.07 a-d	14.70 g-i	14.94 a-c	6.82 b-f	2.91 ab
Gunma	2.88 b-d	12.75 h	18.91 a	7.80 ab	3.01 a-c	2.90 c-e	19.19 a	12.10 i	6.38 d-g	2.45 e-h
<b>Bravo</b>	<b>2.84 b-d</b>	<b>14.07 ef</b>	<b>15.76 bc</b>	<b>7.22 b-e</b>	<b>3.16 a-c</b>	<b>2.83 de</b>	<b>15.30 d-h</b>	<b>13.64 f-h</b>	<b>6.86 b-f</b>	<b>2.41 f-i</b>
Zacapa	2.81 cd	14.00 ef	13.87 jk	7.03 b-f	3.26 ab	2.83 de	14.23 i	14.58 b-e	7.89 ab	3.12 a
Thunderhead	2.81 cd	14.03 ef	14.89 d-g	6.94 b-g	2.74 c	2.79 de	16.03 b-d	13.20 h	6.66c-f	2.21 i
Grand Vantage	2.80 cd	13.54 gf	14.18 g-k	7.31 b-d	3.32 ab	3.20 ab	15.23 d-i	15.09 a-c	7.47 a-d	2.72 b-d
B-3269	2.64 d	14.22 e	13.93 jk	7.42 b-d	3.28ab	3.02 a-e	15.83 b-e	15.07 a-c	7.60 a-c	2.89 bc

\*Values are means for individual heads; 'Bravo' (bolded) is the standard to which all other cultivars were compared; Values in the green text within a column are significantly larger than 'Bravo', values in the red text within a column are significantly smaller than 'Bravo'; "-" indicates the cultivar was not evaluated during the corresponding season.

**Western Site:** Farmers looking for a fall cabbage cultivar that produces heads that are not different in weight than 'Checkmate' can select any of the cultivars grown except 'Ramada'. 'Ramada' may produce lighter heads than 'Checkmate'. Farmers can expect similar head sizes from all the cultivars evaluated as they had head heights and widths that were not different than 'Checkmate'. We observed some differences from 'Checkmate' in core height and width. When long cores are desired, 'Xtreme Vantage' may be selected. When wide cores are preferred, consider 'Bravo'.

For spring cabbage, farmers looking for a cultivar that produces heads that are not different in weight than 'Checkmate' can select any of the ones evaluated. 'Gunma' is an option for cabbage that is shorter than 'Checkmate' and 'Platinum Dynasty' for skinnier heads. The cores of all the cabbage cultivars evaluated were not different than 'Checkmate' which makes all the cultivars evaluated good options for standard-sized cores.

**Central Site:** Farmers wanting to grow fall cabbage heads that are heavier than 'Bravo' can consider 'Capture'. When a lighter weight head is desired 'Blue Vantage', 'Farao', 'Ramada', 'Thunderhead', 'SSR-GC-301', 'Gunma', and 'B-3269' are options. 'Checkmate' and 'Bajonet' are options when heads taller than 'Bravo' are desired and 'SSR-GC-301' may be used when shorter ones are preferred. 'Platinum Dynasty', 'Blue Vantage', 'Farao', 'B-3269', 'Thunderhead', and 'Ramada' produced heads that are narrower than 'Bravo' and can be considered when this trait is desired. When a shorter core than 'Bravo' is preferred, consider 'Platinum Dynasty', 'Farao', 'Gunma', 'Ramada', 'Capture', 'Blue Vantage', 'SSR-GC-301', and 'Thunderhead'. 'Bravo', 'Grand Vantage', and 'Bajonet' had the widest cores. If narrower cores are desired, consider any of the other cultivars evaluated.

For spring cabbage, 'Thunderhead', 'Bronco', 'Capture', 'Artost', 'Zacapa', 'Farao', and 'Tiara' are possibilities when heads that are lighter than 'Bravo' are desired. 'Farao', 'Zacapa', and 'Tiara' are options when heads that are shorter and narrower than 'Bravo' are desired. When heads that are just narrower are preferred, 'Thunderhead', 'Bronco', 'Ramada', 'Artost', and 'Superstar' are options. When heads that are just shorter are preferred, 'Gunma', and 'SRR-GC-301' can be considered. 'Tiara' heads have overall smaller cores than 'Bravo'. When just shorter cores are desired, 'Superstar' and 'Capture' are options. When just narrower cores are preferred, 'Checkmate', 'SRR-GC-301', 'Thunderhead', and 'Farao' are possibilities.

***Southeastern Sites:*** Farmers wanting to grow spring cabbage heads heavier than 'Bravo' can consider 'Conqueror', 'Tiara', and 'Checkmate'. 'Bajonet' is an option for heads that are taller and wider than 'Bravo' and 'SRR-GC-301' for heads that are shorter and narrower. Options for heads that are just taller than 'Bravo' are 'Botran', 'Tiara', 'Blue Vantage', 'Superstar', 'Xtreme Vantage', 'Checkmate', 'Farao', and 'Conqueror'. 'Gunma' is an option when heads that are just shorter than 'Bravo' are desired. 'Superstar', 'Tiara', and 'Farao' are possibilities when heads that are just narrower than 'Bravo' are preferred. For heads with core heights that are longer than 'Bravo', consider 'Gunma'. 'Thunderhead', 'Farao', 'Platinum Dynasty', 'Artost', 'Bajonet', 'Tiara', 'Botran', 'Ramada', 'Grand Vantage', 'Blue Vantage', 'Bronco', 'B-3269', 'Zacapa', and 'Superstar' are options when shorter cores than 'Bravo' are preferred. The core width of all cultivars was not different than 'Bravo'.

For fall cabbage, 'Superstar', 'Grand Vantage' and 'Checkmate' are options for cultivars that produce heads heavier than 'Bravo'. 'Gunma', 'SRR-GC-301', 'Conqueror', and 'Xtreme Vantage' are options when heads taller than 'Bravo' are desired and 'Zacapa' when shorter heads are preferred. Farmers can consider 'Bajonet', 'Superstar', 'Botran', 'Botran', 'Checkmate', 'Grand Vantage', 'B-3269', 'Ramada', 'Bronco', 'Tiara', and 'Zapaca' when they want to produce heads that are wider than 'Bravo' and 'Gunma' and 'SRR-GC-301' when narrower heads are preferred. When taller cores are desired, 'Bajonet' is an option and consider 'SRR-GC-301' for cores that are shorter than 'Bravo'. 'Zacapa', 'Ramada', 'B-3269', 'Conqueror', 'Bronco', 'Grand Vantage', 'Xtreme Vantage', 'Superstar', and 'Artost' are options for cores that are wider than 'Bravo'.

### **Statewide Considerations**

Appearance, days to harvest, and shape are also considerations when selecting cultivars in addition to the data we collected. Click the link to this table for more information about the cultivars evaluated in this evaluation: [Cabbage Cultivars Evaluated](#)

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