

**PENNSYLVANIA VEGETABLE MARKETING AND RESEARCH PROGRAM
PENNSYLVANIA VEGETABLE GROWERS ASSOCIATION
2017 RESEARCH REPORT**

Keeping PA Vegetable Growers Profitable: Statewide Pumpkin Cultivar Trials

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Selecting which cultivar to grow is critical to successful commercial production. When a cultivar suited to an area and having high yield and quality for market is grown, growers can make a profit. In 2016 we evaluated 15-25 lb orange, smooth-faced pumpkins. Pumpkins are an important crop for diversified vegetable operations in Pennsylvania. They are grown on 1,330 of Pennsylvania's 3,968 vegetable farms, ranking 1st in number of farms the US (2012 Census of Agriculture).

The study was conducted in southwestern Pennsylvania at Yarnick's Farm, LLC in Indiana, in central Pennsylvania at Pennsylvania State University's Russell E. Larson Research Center in Pennsylvania Furnace and, in southeastern Pennsylvania State University's Southeast Research and Extension Center in Manheim.

Twenty-one pumpkin cultivars (see Table 1 below) were evaluated in a conventional system in 2016-17. All seed was treated with Farmore except 'Camaro' seed which was untreated.

At all sites, pumpkins were direct seeded. At the southwestern site rows were spaced 6 feet apart with 3 feet between plants and at the central and southeastern site row were spaced 8 feet apart with 4 feet between plants in a row. Four plots of each cultivar were planted with each plot consisting of 6 plants. Data were collected from all 6 plants.

Pests were managed following recommendations in the 2016 Commercial Vegetable Production Recommendation guide.

The standard used was 'Gladiator' based on conversations with growers.

At the southwestern site a raised bed system without plastic mulch was used. When beds were pulled, 600 lb/acre of 13-13-13 was applied through the bedmaker. Direct seeding occurred on June 25, 2016 and June 20, 2017. A single line of drip tape was installed over each bed to use only in the event the crop needed to be saved as there wasn't a pond at this site. In 2016, irrigation was used to get the crop started. Pre-emergent herbicide was applied.

Table 1. Cultivars, seed sources, maturity date of cultivars evaluated in 2016-17.

Cultivar	Source	Maturity^z
Ares	Harris Moran Seed Co., Davis, CA	115
Bayhorse Gold	Rupp Seeds Inc., Wauseon, OH	100
Camaro	Hollar Seeds, Rocky Ford, CO	110
Cargo	Johnny's Selected Seeds, Winslow, ME	100
Challenger	Hollar Seeds, Rocky Ford, CO	100
Eagle City Gold	Rupp Seeds Inc., Wauseon, OH	100
Earlipak	Sakata Seed America, Morgan Hill, CA	95
Early King	Abbot & Cobb	90
Gladiator	Harris Moran Seed Co., Davis, CA	115
Gold Challenge	Rupp Seeds Inc., Wauseon, OH	105
Hannibal	Hybrid Seed Co., Feasterville, PA	105
Honky Tonk	Sakata Seed America, Morgan Hill, CA	105
Kratos	Harris Moran Seed Co., Davis, CA	100
Magic Lantern		110
Magic Wand		115
Mr. Wrinkles	Sakata Seed America, Morgan Hill, CA	100
Orange Rave	Rupp Seeds Inc., Wauseon, OH	105
Rhea	Harris Moran Seed Co., Davis, CA	105
Solid Gold	Rupp Seeds Inc., Wauseon, OH	100
Spartan	Sakata Seed America, Morgan Hill, CA	100
Zeus	Harris Moran Seed Co., Davis, CA	110

^zBased on seed catalogs.

Pumpkins were harvested on October 8, 2016 and October 10 and 13, 2017 and were categorized as fully orange, turning orange, mature green and unmarketable. Quality of the handles was also determined at this site.

At the central site, potash, and phosphate were applied based on soil test recommendations. Additionally, 50 lb/acre nitrogen was broadcast preplant on 23 May 2016 and 12 June 2017. An additional 25 lb/acre nitrogen was fertigated throughout the growing season. At this site a plasticulture system using a single line of drip tape (T-Tape model 508-12-450; John Deere, Moline, IL) placed on the center of the bed and black embossed plastic mulch (Sigma Plastic Groups, Allentown, PA) was used. Beds were pulled and plastic and drip tape were installed on June 10, 2016 and June 12, 2017. Plants were provided with 1-1.5 acre-inches of water each week through drip irrigation. Herbicide was also applied on June 10, 2016 and June 13, 2017. Planting holes were punched and direct seeding occurred on June 13, 2016 and June 22, 2017.

Pumpkins were harvested on September 16 and 20, 2016 and cut on September 29 and harvested on October 5, 2017. Pumpkins were counted and weighed in these categories: fully orange, turning orange or mature green (full sized and dark green) and unmarketable. Immature green fruit were left in the field.

At the southeastern site pumpkin seed were direct seeded in a no-till system into rye residue on June 7, 2016 and June 8, 2017. A single line of drip tape tape (T-Tape model 508-12-450; John Deere, Moline, IL) was placed in the center of each row. Plants were provided with 1-1.5 acre-inches of water each week through drip irrigation. Based on soil test recommendations, phosphate, and potash were not applied. Nitrogen was applied at a rate of 90 lb/acre with 50 lbs broadcast preplant and the remainder fertigated throughout the growing season.

Pumpkins were harvested on October 14, 2016 and October 11 and 16, 2017. At this site harvest occurred when all fruit was fully orange (no fruit was turning orange). Quality of the handles (stems) was rated at this site using a 1-5 scale with 5 indicating the highest quality.

Data were pooled by site and year and analyzed using the GLIMMIX. Means were separated at the 5% level using the slice option to perform Tukey’s multiple comparison test.

Results

Significant interactions between year, site, and cultivar were observed for many variables as indicated in Table 2 below.

Table 2. Statistical interactions between site, year, and cultivar for 21 cultivars of pumpkin grown in 2016-17 in three locations in Pennsylvania. ‘*’ indicates interaction significant at the 5% level, ‘NS’ indicates the interaction was not significant.

	Marketable yield (lb)	Marketable yield (no.)	Unmarketable yield (no.)
Site x year	*	*	*
Site x cultivar	*	*	NS
Year x cultivar	NS	*	*
Site x year x cultivar	NS	*	NS

Southwestern Site

Yields in 2016 were lower at this site because of stress early in the growing season. Planting was delayed due to very dry conditions, then dry weather post emergence through the 3rd week of July resulted in slow and uneven germination and growth. In 2017, extended wet weather created favorable conditions for phytophthora blight which limited yields.

Mean weight of marketable pumpkins for all cultivars was not different from ‘Gladiator’ or each other in both years (Table 3).

Mean number of marketable pumpkins for all cultivars was not different from ‘Gladiator’ or each other in both years.

Mean number of unmarketable pumpkins for all cultivars was not different from ‘Gladiator’ or each other in both years (Table 4).

Central Site

'Challenger' produced a higher mean weight of marketable pumpkins than 'Gladiator' in 2016. 'Early King' and 'Camaro' produced a higher mean weight than 'Gladiator' in 2017. Marketable pumpkin weight was not different for any other cultivar in either year compared to 'Gladiator'. In 2016, 'Challenger' produced higher mean pumpkin weight than 'Eagle City Gold', 'Gold Challenger', 'Gladiator', 'Mrs. Wrinkles', and 'Zeus'. No other differences between cultivars were observed. In 2017, 'Early King' produced higher mean pumpkin weight than 'Gold Challenger', 'Hannibal', 'Gladiator' and 'Zeus'. Additionally, 'Camaro' produced higher mean pumpkin weight than 'Gladiator' and 'Zeus'. No other differences between cultivars were observed.

Mean number of marketable pumpkins from 'Gladiator' plants was not different than any other cultivar in both years. In 2016, 'Honky Tonk' produced more marketable pumpkins than 'Gold Challenger' and 'Cargo'. Additionally, 'Camaro' outperformed 'Cargo' in marketable number of fruit in 2017.

Mean number of unmarketable pumpkins for all cultivars was not different from 'Gladiator' in both years.

Southeastern Site

Mean weight of marketable pumpkins for all cultivars was not different from 'Gladiator' in both years (Table 3). In 2016, 'Challenger' marketable weight was higher than 'Eagle City Gold'. In 2017, 'Kratos' marketable weight was higher than 'Hannibal' and 'Gold Challenger'. All other cultivars were not different from each other.

In 2016, the mean number of marketable pumpkins was not different from any cultivar. In 2017, mean number was not different from 'Gladiator' for any cultivar. In this year, 'Kratos' yielded more pumpkins than 'Gold Challenger'. All other cultivars were not different from each other.

Mean number of unmarketable pumpkins for all cultivars was not different from 'Gladiator' or each other in both years.

Based on yield, all cultivars evaluated were not different than the standard 'Gladiator'. Growers should consider quality including shade of orange, shape, and degree of ribbing when selecting cultivars. Many cultivars can be selected to meet varying consumer preference for these quality factors without sacrificing yield.

Table 3. Marketable yield of 21 pumpkin cultivars grown at three locations in Pennsylvania in 2016-17.

Cultivar	Marketable Yield (lb)						Marketable Yield (no.)					
	Southwestern Site		Central Site		Southeastern Site		Southwestern Site		Central Site		Southeastern Site	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Ares	34 a ²	27 a	294 ab	285 abc	192 ab	257 ab	1.5 a	1.3 a	16.3 ab	11.0 ab	12.0 a	11 ab
Bayhorse Gold	58 a	57 a	223 ab	279 abc	164 ab	240 ab	2.8 a	2.8 a	13.3 ab	13.0 ab	12.5 a	11.3 ab
Camaro	41 a	77 a	310 ab	354 ab	152 ab	236 ab	1.8 a	5.3 a	13.3 ab	16.9 a	10.8 a	10.0 ab
Cargo	31 a	39 a	236 ab	230 abc	196 ab	208 ab	1.8 a	1.8 a	11.8 b	8.0 b	11.0 a	8.0 ab
Challenger	54 a	95 a	355 a	323 abc	286 a	247 ab	1.5 a	2.8 a	17.0 ab	10.5 ab	15.5 a	9.3 ab
Eagle City Gold	68 a	47 a	207 b	318 abc	131 b	269 ab	3.5 a	2.5 a	13.5 ab	15.3 ab	10.5 a	12.0 ab
Earlipak	23 a	15 a	234 ab	252 abc	174 ab	229 ab	1.0 a	1.0 a	13.3 ab	9.7 ab	10.3 a	8.5 ab
Early King	49 a	7 a	323 ab	366 a	247 ab	244 ab	1.8 a	0.5 a	15.0 ab	13.0 ab	14.8 a	9.0 ab
Gladiator	27 a	4 a	201 b	197 c	152 ab	233 ab	1.0 a	0.3 a	15 ab	9.5 ab	11.8 a	12.0 ab
Gold Challenger	33 a	28 a	210 b	221 bc	163 ab	139 b	1.5 a	2.0 a	11.5 b	11.0 ab	10.0 a	6.8 b
Hannibal	51 a	69 a	216 ab	200 bc	165 ab	175 b	2.0 a	3.3 a	13 ab	10.5 ab	10.3 a	8.3 ab
Honky Tonk	43 a	24 a	248 ab	250 abc	169 ab	209 ab	2.3 a	1.5 a	20.0 a	12.3 ab	13.8 a	11.3 ab
Kratos	58 a	48 a	277 ab	310 abc	196 ab	326 a	1.8 a	2.5 a	17.0 ab	12.8 ab	12.8 a	14.8 a
Magic Lantern	59 a	11 a	224 ab	282 abc	167 ab	182 ab	2.5 a	1.0 a	18 ab	14.5 ab	15.3 a	9.8 ab
Magic Wand	62 a	11 a	232 ab	235 abc	169 ab	218 ab	2.5 a	0.8 a	18.0 ab	11.5 ab	13.0 a	11.5 ab
Mrs. Wrinkles	83 a	0 a	183 b	267 abc	187 ab	191 ab	5.3 a	0.0 a	12.5 ab	12.3 ab	14.5 a	10.0 ab
Orange Rave	71 a	25 a	255 ab	268 abc	173 ab	224 ab	3.8 a	1.5 a	17.5 ab	12.8 ab	12.0 a	12 ab
Rhea	62 a	30 a	250 ab	261 abc	145 ab	259 ab	2.0 a	1.5 a	17.3 ab	9.8 ab	10.0 a	11.5 ab
Solid Gold	56 a	43 a	254 ab	275 abc	193 ab	230 ab	2.3 a	2.5 a	13.0 ab	10.8 ab	10.8 a	9.5 ab
Spartan	33 a	27 a	225 ab	286 abc	219 ab	225 ab	1.5 a	1.5 a	14.8 ab	10.5 ab	15.0 a	10.5 ab
Zeus	26 a	14 a	165 b	193 c	171 ab	205 ab	1.0 a	0.8 a	13 ab	11.0 ab	14.8 a	10.8 ab

²Values are the mean of 4 replications; data were analyzed using GLIMMIX and means were separated at the 5% level using the slice option to perform Tukey's multiple comparison test; values followed by different letters within a column are significantly different.

Table 2. Unmarketable yield of 21 cultivars of pumpkins grown in three locations in Pennsylvania in 2016-17.

Cultivar	Unmarketable Yield (no.)					
	Southwestern Site		Central Site		Southeastern Site	
	2016	2017	2016	2017	2016	2017
Ares	0.0 ²	1.5	0.0	0.3	0.8	1.8
Bayhorse Gold	0.0	1.5	0.5	0.0	2.0	1.8
Camaro	0.3	2.0	0.0	0.0	3.3	1.8
Cargo	0.0	2.3	0.0	0.0	0.8	2.3
Challenger	0.0	2.25	0.0	0.3	2.5	1.8
Eagle City Gold	0.0	2.5	0.0	0.0	1.3	1.0
Earlipak	0.0	3.3	0.0	0.0	1.0	2.0
Early King	0.3	2.0	0.3	0.3	1.0	1.5
Gold Challenger	0.0	1.3	0.5	0.0	1.8	2.8
Gladiator	0.0	2.5	0.5	0.3	1.0	2.3
Hannibal	0.0	2.3	0.0	0.3	2.8	3.3
Honky Tonk	0.0	3.3	0.0	0.3	0.5	2.3
Kratos	0.3	2.0	0.0	0.0	0.3	3.3
Magic Lantern	0.0	3.8	0.3	0.5	0.8	1.5
Magic Wand	0.0	3.3	0.0	0.0	1.0	3.5
Mrs. Wrinkles	0.3	0.5	1.0	0.5	1.3	2.0
Orange Rave	0.0	1.0	0.3	0.0	2.0	1.3
Rhea	0.3	1.5	0.5	0.3	1.0	2.8
Solid Gold	0.3	1.8	0.3	0.5	1.3	1.8
Spartan	0.0	1.0	0.0	0.3	0.8	2.8
Zeus	0.0	3.8	0.3	0.8	1.5	2.0

²Values are the mean of 4 replications; data were analyzed using GLIMMIX and means were separated at the 5% level using the slice option to perform Tukey's multiple comparison test; values followed by different letters within a column are significantly different.