

2021 Eastern North Carolina Pumpkin Cultigen Evaluation Study



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Pumpkin Cultigen Evaluation Study

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General Cultural Practices

The pumpkin cultigen evaluation study was grown on beds in no-till wheat straw with overhead irrigation. Pesticides used on all plots were chemicals labeled for that crop, (2021 North Carolina Agricultural Chemicals Manual, <https://content.ces.ncsu.edu/north-carolina-agricultural-chemicals-manual>).

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Disclaimer

This publication presents data from the pumpkin cultigen evaluation study conducted during 2021. Information contained in this report is believed to be reliable but should not be relied upon as a sole source of information. Limited accompanying detail is included but excludes some pertinent information, which may aid interpretation.

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Introduction

In 2020, North Carolina ranked 13th in pumpkin production for the United States, which represented 1% of total U.S. production (2021 North Carolina Agricultural Statistics, USDA NASS). There was an estimated 3,500 acres of pumpkins harvested in North Carolina for 2021, which translated to a 7.3 million USD production value for the state (2021 State Agriculture Overview, USDA NASS). Pumpkin production in most states is targeted towards the seasonal fresh market for ornamental use and home processing. Growers in the U.S. mainly produce jack-o'-lantern type pumpkins, but the demand for specialty pumpkins like 'Blue', 'White', 'Cinderella', 'Warty', etc. is growing as consumers look for new and interesting varieties. Peak retail price occurred in the fourth week of October of 2021, at an average price of \$5.80 per pumpkin for 'Howden' (jack-o'-lantern type) pumpkins. This is a significant increase from the retail price in 2020, which was \$4.10 per 'Howden' pumpkin during the same time period (Pumpkins: Background & Statistics, ERS USDA). In the western parts of NC, pumpkin production is extensive due to the favorable climate and soil conditions of the region. Growing conditions in the higher elevations in western NC seems to translate to less disease pressure (2019 North Carolina and Tennessee Pumpkin Cultigen Evaluations, NCSU). A smaller, yet growing percentage of NC grown pumpkins are raised in the hotter, more humid areas of the eastern part of the state. Due to the difference in climate, eastern growers must approach pumpkin production slightly different than western growers. Cultivars that yield well with high quality in the west may not respond the same in the east. Due to the climatic differences, eastern growers seek cultivars with higher heat tolerance and disease resistance. The pumpkin cultigens in this evaluation study were grown in the Eastern region of NC at A.J. Smith & Sons Farm in Edenton, NC. One of the primary goals of this study was to evaluate current and new pumpkin cultigens in the 30 to 40 count bin size class (15-20 lb) as this is currently where demand is highest. A few recently released smaller cultivars (< 10 lb) were also included in the study due to the increasing market demand for specialty types, which also includes different color and texture rinds. The cultigens in this study were mainly evaluated for yield and size. However, each entry was also rated for shape, color, suturing, handle characteristics, and fruit size measurements. The fruit obtained from each replicated entry are also identified in a photograph; except for 'XPU 6002' due to lack of fruit set. Several other cultigens were included in the study as observation plots (non-replicated) and photographs of these entries are included for identification.

Materials and Methods

The study was conducted at A.J. Smith & Sons Farm in Edenton, NC. Seeds were planted on 15 June 2021 on beds in no-till wheat straw and were watered with overhead irrigation. A total of 26 entries were evaluated, with 8 of the 26 entries included as observation (non-replicated) plots.

The 18 replicated entries were evaluated in a randomized complete block design (RCBD) with 4 replications. ‘Kratos’ and ‘Orange Sunrise’ were included as industry standards for the 30-40 count bin size. Each plot measured 20 feet long with 5 plants spaced 4 feet apart in-row and 6 feet apart between-row. Each plot was evaluated at 1 and 2 weeks after planting to ensure a full stand count of 5 plants per plot. The study was harvested 13 September 2021, 90 days after planting (DAP), and fruit were evaluated for yield and quality. Pumpkin color, shape and suturing, as well as handle length, thickness, and attachment were rated subjectively for each plot. For a detailed description of how each quality parameter was measured, see Table 5 and Table 6 footnotes.

Results

Pumpkin entries are discussed by size category (small and medium) and are organized in tables alphabetically. A representative photo, grouped by size category, was taken of each cultigen which aimed to illustrate key characteristics of each entry (Fig. 1, Fig. 2, Fig. 3) A list of the entries by size category are included in (Table 1).

Small (< 10 lb)

6 entries were evaluated in the ‘small’ size category (< 10 lb). Average fruit size ranged from 3.2 to 8.5 lb with ‘Yosemite’ (RPX 6888) being the smallest and ‘Moon Beam’ being the largest (Table 2). The cultigen with the highest total yield in the small size category was Baby Moon at 42,761 lb/ac. The immature fruit yield for Baby Moon was 2,786 lb/ac which left a marketable yield of 39,975 lb/ac for this cultigen. ‘Lemonade’ had the lowest total yield in the small fruit size category at 9,610 lb/ac. ‘Lemonade’ also had the highest percent of immature fruit by weight at 23%. The cultigen with the highest total fruit number (no.) per acre was Baby Moon at 11,162 no./ac, of which 89% were mature at the time of harvest. ‘Lemonade’ had the lowest total fruit number at 1,452 no./ac, of which only 69% were mature at the time of harvest. Percent immature fruit by number ranged from 9% with ‘Pipsqueak’ and ‘Yosemite’ (RPX 6880), to 31% with ‘Lemonade’. ‘Baby Moon’, ‘Honey Moon’, and ‘Moon Beam’ were white, ‘Pipsqueak’ and ‘Yosemite’ (RPX 6880) were orange, and ‘Lemonade’ was yellow. Fruit shape was round to moderately tall.

Medium (10 – 15 lb)

12 entries were evaluated in the ‘medium’ size category (10-15 lb). Data for entry ‘XPU 6002’ could not be collected due to a lack of fruit set. Thus, there is no photograph in Figure 2 or data that could be presented in Tables 3 and 5. Average fruit size ranged from 10.6 to 14.2 lb with

‘Fright’ being the smallest and ‘Giltedge Gold’ (RPX 6879) being the largest (Table 3). ‘JPN-4448’ had the highest total yield in the medium size category at 44,454 lb/ac. The immature fruit yield for ‘JPN-4448’ was 5,291 lb/ac with the remaining marketable yield being 39,163 lb/ac. ‘Tons of Fun’ had the lowest total yield in the medium fruit category at 5,781 lb/ac. The cultigen with the highest percent of immature fruit by weight was Magic Wand at 59%. The cultigen with the highest total fruit number per acre was JPN-4448 at 4,265 no./ac. Although ‘JPN-4448’ had the highest total fruit number, ‘Fright’ had a similar marketable yield compared to ‘JPN-4448’. This is due to the number of immature fruit. ‘JPN-4448’ had 726 immature fruit per acre and ‘Fright’ had 0. ‘Tons of Fun’ had the lowest total fruit number at 545 no./ac. The cultigen with the highest percent of immature fruit by fruit number was Magic Wand at 63%. All fruit in this size category were orange, with the exception of ‘Fright’ and ‘Knuckle Head’, which both had an orange base and green warts. Fruit shapes were mostly round (Table 4).

Specialty Pumpkins (Observation Plots)

Blanco and Speckled Hound cultivars produced high tonnage and high numbers of fruit per acre (Table 5). The high tonnage with these cultivars was especially good given the relatively small size of fruit (approximately 5 lb). The Porcelain Doll cultivar produced a high tonnage per acre; however, 20% of fruits were immature. A delay in harvest would have likely resulted in increased marketable yields. Kakai, Long Island Cheese, and Sunlight cultivars had relatively low yields in this study. Additional quality and descriptor information for these specialty cultivars can be found in Table 6.

Discussion

Overall, this study showed lower yields when compared to previous pumpkin cultigen evaluations at different locations. This was expected due to the climatic differences between eastern and western North Carolina. For example, the cultigen Bayhorse Gold yielded 1,724 fruit per acre at the Edenton location in 2021, compared 2,360 fruit per acre in the 2019 eastern study (2019 Northeast North Carolina and Southeast Virginia on Farm Pumpkin Cultigen Evaluation Study, NCSU). These eastern yields for ‘Bayhorse Gold’ are both far lower than the 3,549 fruit per acre obtained at the Upper Mountain Research Station in Laurel Springs, NC in 2019 (2019 North Carolina and Tennessee Pumpkin Cultigen Evaluations, NCSU). Another example is the cultigen Orange Sunrise, included in the study as an industry standard, which yielded 2,450 fruit per acre at Edenton in 2021, compared to 2,632 fruit per acre in the east in 2019, and 4,356 fruit per acre at Laurel Springs in 2019.

This study also demonstrated smaller fruit sizes than the 2019 evaluations. The average fruit weight for ‘Bayhorse Gold’ in the 2021 study was 12.9 lb compared to 15.1 lb in the 2019 eastern study, and 21.1 lb in the 2019 Laurel Springs study. Due to this difference in size,

'Bayhorse Gold' was classified as a 'medium' sized pumpkin in the 2021 and 2019 eastern studies, but was classified as an 'extra-large' sized pumpkin in the 2019 study Laurel Springs study. Similarly, the cultigen Kratos, also included in this study as an industry standard, was classified in the 2019 and 2021 eastern studies as a 'medium' sized pumpkin with average fruit weights of 13.7 lb and 13.2 lb respectively, but categorized as 'Jumbo' in the 2019 Laurel Springs study with average fruit weights of 25.5 lb.

The data from this study suggests Eastern pumpkin growers may experience lower yields in terms of fruit number and size as compared to western growers. Eastern growers should also take note, when selecting cultigens from seed catalogs, that advertised fruit size categories may not hold true for certain cultigens in the harsher eastern climate. Pumpkin production is more challenging in eastern North Carolina due to the warmer temperatures and higher humidity. However, these studies help growers select more heat tolerant varieties that can produce acceptable yields in their growing conditions. This study helps illustrate the importance of evaluating pumpkin cultigens in different environments, as cultigen response can be quite variable.

Figure 1. Photographs of small size pumpkins from replicated entries, Edenton, NC, 2021



Figure 1. Photographs of small size pumpkins from replicated entries, Edenton, NC, 2021



Figure 1. Photographs of small size pumpkins from replicated entries, Edenton, NC, 2021



Figure 2. Photographs of medium size pumpkins from replicated entries, Edenton, NC, 2021



Figure 2. Photographs of medium size pumpkins from replicated entries, Edenton, NC, 2021



Figure 2. Photographs of medium size pumpkins from replicated entries, Edenton, NC, 2021



Figure 2. Photographs of medium size pumpkins from replicated entries, Edenton, NC, 2021



Figure 2. Photographs of medium size pumpkins from replicated entries, Edenton, NC, 2021



Figure 2. Photographs of medium size pumpkins from replicated entries, Edenton, NC, 2021



Photograph of XPU 6002 not available

Figure 3. Photographs of pumpkins from observational entries, Edenton, NC, 2021



Figure 3. Photographs of pumpkins from observational entries, Edenton, NC, 2021



Kakai
Johnny's Selected Seeds



**Long Island
Cheese**
Johnny's Selected Seeds

Figure 3. Photographs of pumpkins from observational entries, Edenton, NC, 2021



Figure 3. Photographs of pumpkins from observational entries, Edenton, NC, 2021



Table 1. Eastern NC Pumpkin Cultigen Study, Pumpkin Entries, Edenton, NC 2021.

Small (< 10 lb)¹	Company	Description
Baby Moon	Hollar	White - 6 lb
Honey Moon	Hollar	White - 10 lb
Lemonade	HM Clause	Yellow
Moon Beam	Hollar	White - 8 lb
Pipsqueak	Johnny's	Small, Jack Type ²
Yosemite (RPX 6880)	Rupp	Small, Jack with Ridging
Medium (10.1 - 15 lb)¹	Company	Description
Bayhorse Gold	Rupp	Medium , Jack Type
Duchess (JPN-16-4346)	Johnnys	Medium, Jack Type
Fright	Rupp	Warty
JPN-4448	Johnnys	Medium, Jack Type
Knuckle Head	Rupp	Warty
Kratos	HM Clause	Industry Standard Jack Type
Magic Wand	HM Clause	Medium, Jack Type
Orange Sunrise	HM Clause	Industry Standard Medium, Jack Type
Giltedge Gold (RPX 6879)	Rupp	Medium, Jack with Ridging
Spartacus	Sakata	Medium, Jack Type
Tons of Fun	Sakata	Medium, Jack Type
XPU 6002	Sakata	Medium, Jack Type
Observational	Company	Description
Blanco	Johnny's	White
Flat Stacker	DP Seeds	White
Kakai	Johnny's	Green Stripe with Light Orange
Long Island Cheese	Johnny's	Buff, Beige
Porcelain Doll	Rupp	Pink, Salmon
Speckled Hound	Johnny's	Red, Light Green Mottled
Sunlight	Johnny's	Yellow
Turks Turban	Johnny's	Red, Green, White

¹Size categories based on yield data.

²Jack type indicates pumpkins used for carving

Table 2. Eastern NC Pumpkin Cultigen Study. Yield, Fruit Number, Average Fruit Weight, and Percent Immature for Small Fruit (< 10 lb), Edenton, NC 2021.

Cultigen	Yield					Fruit Number			Percent Immature	
	Yield (tons/ac)	Marketable Yield (lb/ac)	Immature Fruit Yield (lb/ac)	Total Yield (lb/ac)	Avg. Fruit Weight (lb/fruit)	Marketable Fruit (no./ac)	Immature Fruit (no./ac)	Total Fruit (no./ac)	Percent Immature fruit weight	Percent Immature fruit number
Baby Moon	20.0	39975	2786	42761	3.9	10255	908	11162	8	11
Honey Moon	12.9	25827	2169	27996	8.2	3176	635	3812	9	17
Lemonade	3.4	6861	2750	9610	7.4	907	545	1452	23	31
Moon Beam	10.0	20074	3830	23904	8.5	2360	998	3358	16	29
Pipsqueak	9.7	19330	1615	20945	3.4	5627	635	6262	6	9
Yosemite (RPX 6880)	4.8	9529	790	10318	3.2	2995	363	3358	6	9
Average	10.1	20266	2323	22589	5.8	4220	681	4901	12	17
LSD	8.6	17271	4040	17078	1.5	4124	1195	3911	22	32

No yield data could be collected for entry XPU 6002 because there was no fruit set.

Table 3. Eastern NC Pumpkin Cultigen Study. Yield, Fruit Number, Average Fruit Weight, and Percent Immature for Medium Fruit (10 - 15 lb), Edenton, NC 2021.

Cultigen	Yield					Fruit Number			Percent Immature	
	Yield (tons/ac)	Marketable Yield (lb/ac)	Immature Fruit Yield (lb/ac)	Total Yield (lb/ac)	Avg. Fruit Weight (lb/fruit)	Marketable Fruit (no./ac)	Immature Fruit (no./ac)	Total Fruit (no./ac)	Percent Immature fruit weight	Percent Immature fruit number
Bayhorse Gold	9.8	19666	1624	21290	12.9	1543	182	1724	6	8
Duchess (JPN-16-4346)	13.4	26880	3340	30220	11.4	2360	454	2813	10	14
Fright	19.1	38106	0	38106	10.6	3630	0	3630	0	0
JPN-4448	19.6	39163	5291	44454	11.2	3539	726	4265	13	18
Knuckle Head	10.7	21476	653	22129	11.9	1815	91	1906	3	5
Kratos	11.8	23522	1670	25192	13.2	1815	182	1997	7	10
Magic Wand	3.8	7650	5509	13159	12.3	635	908	1543	59	63
Orange Sunrise	9.8	19593	5109	24702	11.4	1724	726	2450	31	38
Giltedge Gold (RPX 6879)	12.8	25601	2695	28296	14.2	1906	363	2269	11	17
Spartacus	5.4	10808	2269	13077	13.1	817	363	1180	19	25
Tons of Fun	2.6	5146	635	5781	13.6	363	182	545	25	25
Average	10.8	21601	2618	24219	12.4	1832	380	2211	17	20
LSD	12.0	24057	9047	21419	4.2	2213	1323	1928	66	72

No yield data could be collected for entry XPU 6002 because there was no fruit set.

Table 4. Eastern NC Pumpkin Cultigen Study. Fruit and Quality Measurements for Replicated Cultigens, Edenton, NC, 2021.

Cultigen	Fruit Color	Fruit Shape ¹	Fruit Suturing ²	Fruit Texture ³	Handle ⁴			Fruit ⁵		
					Thickness	Attachment	Length	Length (in)	Width (in)	L/D (in)
Baby Moon	White	4.8	3.0	2.3	4.0	4.8	5.3	6.0	6.9	0.9
Bayhorse Gold	Orange	5.8	5.0	3.3	6.0	6.5	6.0	9.3	10.0	0.9
Duchess (JPN-16-4346)	Orange	5.8	6.8	5.8	5.8	6.8	6.5	9.3	9.8	1.0
Fright	Orange	7.3	3.0	8.0	4.5	7.3	6.0	9.8	8.7	1.1
Honey Moon	White	7.0	3.3	3.5	4.3	4.8	4.3	8.7	8.0	1.1
JPN-4448	Orange	5.3	5.0	3.3	5.5	6.0	5.5	8.7	9.8	0.9
Knuckle Head	Orange	6.5	3.0	7.5	4.0	8.0	7.0	9.9	9.5	1.0
Kratos	Orange	6.3	4.5	3.5	6.8	6.8	5.5	10.5	10.2	1.0
Lemonade	Yellow	6.7	3.3	4.0	4.7	7.0	8.3	9.0	8.4	1.1
Magic Wand	Orange	4.0	5.0	5.0	6.0	7.0	5.0	8.8	9.8	0.9
Moon Beam	White	6.0	4.0	4.0	4.0	5.0	4.5	8.4	8.1	1.1
Orange Sunrise	Orange	5.8	5.5	4.3	5.8	6.8	5.0	9.9	10.2	1.0
Pipsqueak	Orange	7.0	4.5	4.8	5.3	5.0	7.0	6.6	6.0	1.1
Giltedge Gold (RPX 6879)	Orange	6.3	5.3	5.5	6.3	6.8	6.3	10.5	10.0	1.1
Yosemite (RPX 6880)	Orange	6.8	3.0	3.5	7.0	4.5	3.0	6.0	5.6	1.1
Spartacus	Orange	4.8	5.0	4.3	7.0	6.7	4.7	9.1	10.1	0.9
Tons of Fun	Orange	5.5	5.5	5.0	6.0	7.5	5.5	10.5	10.9	1.0
Average	--	6.0	4.4	4.5	5.5	6.3	5.6	8.9	8.9	1.0

¹Fruit Shape Rating: 1 = flat, 5 = round, 9 = tall.

²Fruit Suturing: 1 = none, 5 = medium, 9 = deep.

³Texture Rating: 1 = smooth, 5 = semi-rough, 9 = rough.

⁴Handle Rating:

Thickness: 1 = thin, 5 = medium, 9 = thick.

Attachment: 1 = poor, 5 = average, 9 = excellent.

Length: 1 = short, 5 = medium, 9 = long.

⁵Fruit Measurements = Individual length and width values (inches) were taken from 5 fruit per replication, (20 total). The LD ratio was determined by dividing fruit length by fruit width.

No quality measurements could be collected for entry XPU 6002 because there was no fruit set.

Table 5. Eastern NC Pumpkin Cultigen Study. Yield, Fruit Number, Average Fruit Weight, and Percent Immature for Specialty Pumpkins (Observational), Edenton, NC 2021.

Cultigen	Yield					Fruit Number			Percent Immature	
	Yield (tons/ac)	Marketable Yield (lb/ac)	Immature Fruit Yield (lb/ac)	Total Yield (lb/ac)	Avg. Fruit Weight (lb/fruit)	Marketable Fruit (no./ac)	Immature Fruit (no./ac)	Total Fruit (no./ac)	Percent Immature fruit weight	Percent Immature fruit number
Blanco	25.5	50965	4646	55612	4.7	10890	2178	13068	8	17
Flat Stacker	53.1	106286	7187	113474	19.5	5445	1089	6534	6	17
Kakai	5.5	10926	2759	13685	5.0	2178	363	2541	20	14
Long Island Cheese	3.3	6679	0	6679	9.2	726	0	726	0	0
Porcelain Doll	37.0	73907	20437	94344	14.5	5082	2541	7623	22	33
Speckled Hound	51.4	102838	5754	108591	5.2	19602	2178	21780	5	10
Sunlight	10.3	20691	1670	22361	3.2	6534	726	7260	7	10
Turks Turban	18.2	36409	871	37280	3.9	9438	363	9801	2	4
Average	25.5	51088	5416	56503	8.2	7487	1180	8667	9	13

Table 6. Eastern NC Pumpkin Cultigen Study. Fruit and Quality Measurements for Specialty Pumpkins (Observational), Edenton, NC, 2021.

Cultigen	Fruit Color	Fruit Shape ¹	Fruit Suturing ²	Fruit Texture ³	Handle ⁴			Fruit ⁵		
					Thickness	Attachment	Length	Length (in)	Width (in)	L/D (in)
Blanco	White	2.0	6.0	2.0	7.0	5.0	4.0	6.5	7.5	0.9
Flat Stacker	White	1.0	6.0	3.0	2.0	3.0	6.0	5.7	14.1	0.4
Kakai	Orange, Green Stripe	5.0	1.0	1.0	5.0	5.0	4.0	6.8	7.8	0.9
Long Island Cheese	Buff, Beige	1.0	5.0	2.0	2.0	3.0	4.0	5.1	10.4	0.5
Porcelain Doll	Pink, Salmon	2.0	8.0	3.0	4.0	3.0	6.0	6.3	11.3	0.6
Speckled Hound	Red, Green Mottled	2.0	6.0	2.0	3.0	1.0	2.0	4.2	8.1	0.5
Sunlight	Yellow	4.0	3.0	4.0	7.0	4.0	6.0	5.0	6.0	0.8
Turks Turban	Red, Green, White	1.0	3.0	3.0	4.0	3.0	5.0	5.0	8.5	0.6
Average	--	2.3	4.8	2.5	4.3	3.4	4.6	5.6	9.2	0.6

¹Fruit Shape Rating: 1 = flat, 5 = round, 9 = tall.

²Fruit Suturing: 1 = none, 5 = medium, 9 = deep.

³Texture Rating: 1 = smooth, 5 = semi-rough, 9 = rough.

⁴Handle Rating:

Thickness: 1 = thin, 5 = medium, 9 = thick.

Attachment: 1 = poor, 5 = average, 9 = excellent.

Length: 1 = short, 5 = medium, 9 = long.

⁵Fruit Measurements = Individual length

and width values (inches) were taken from 5 fruit per replication, (20 total). The LD ratio was determined by dividing fruit length by fruit width.