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Pumpkin Variety Performance With and Without Treatment for Powdery Mildew in Northern Indiana, 2009

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Introduction

Pumpkins for decorative use are grown on more than 4,000 acres in Indiana. Combined acreage in Indiana, Michigan, Illinois, and Ohio represents about a quarter of pumpkins grown for decorative use in the United States. Successful pumpkin production requires the use of cultivars that yield well and produce pumpkins of the size, shape, color, and quality demanded by the market. Genetic resistance to the fungal disease powdery mildew is present in some varieties. This trial was designed to evaluate performance of pumpkin varieties in northern Indiana with and without treatment for powdery mildew. The trial included eight jack-o-lantern size pumpkins, one small or pie pumpkin, and three mini-pumpkins. Also reported are yield and fruit characteristics for 17 additional varieties grown in unreplicated plots.

Materials and Methods

Trials were conducted at the Pinney-Purdue Agricultural Center in Wanatah, Indiana. In a replicated trial treatments were arranged in a split-plot design with powdery mildew treatment (yes or no) as the main plot, and variety as the subplot. Treatments were replicated three times in blocks. Subplots were 36 feet long by 21 feet wide. Main plots were 84 feet wide and included three tiers of four subplots, separated by 15-foot alleys. On either side of the replicated trial, seventeen varieties were planted in single plots as an observation trial. They were managed similarly to the replicated trial, with all plots receiving fungicide applications for powdery mildew.

The soil was a Tracy sandy loam. The Fall 2008 soil test showed 1.2% organic matter, pH 6.4, 25 ppm phosphorus (P), 93 ppm potassium (K), 165 ppm magnesium (Mg), and 600 ppm calcium (Ca). Prior to planting wheat as a cover crop in fall 2008, we applied 20, 30, and 45 lb./A N, P₂O₅ and K₂O, plus 7.8 lb./A S and 0.8 lb./A Zn. In spring 2009, wheat was killed with glyphosate in early May and incorporated. Fertilizer (375 lb./A 6-24-24) was broadcast to provide 22.5 lb. N, 90 lb. P₂O₅ and 90 lb. K₂O per acre. An additional 57.5 lb. N per acre was sidedressed as UAN on June 30. Pumpkins were planted on June 5 using a modified John Deere Maximerge 7000 planter and dropping seeds by hand into the seed tube. Each pumpkin cultivar was planted in six subplots 36 feet long and 21 feet wide with two rows spaced 7 feet 4 inches apart. Weeds were controlled with the preemergence herbicide Strategy[®] (ethalfluralin+clomazone) applied at 4 pt./A on June 5, and by cultivation, hoeing, and hand weeding. Overhead irrigation was applied during the season as needed. Pumpkins were thinned to achieve the desired stand of 24 plants per plot (1,383 plants/A). The insecticide Arctic[®] 3.2 EC was applied at 4 oz./A on July 10 and July 17 for squash vine borer. Main plots assigned to receive treatment for powdery mildew were treated with Nova[®] 40W at 4 oz./A and Bravo Ultrex[®] at 1.4 lb./A. on July 23, and August 7 and 21, and with Pristine[®] at 18.5 oz./A on July 31, August 14 and 31. All plots were protected against downy mildew with applications of Ranman[®] at 2.1 oz./A on August 21, and Previcur Flex[®] at 1.2 pt./A on August 14 and 31.

Downy mildew on pumpkins was not observed on the experimental farm during the growing season.

Powdery mildew severity was evaluated on September 5-7 by: (1) estimating percent leaf surface covered with powdery mildew on upper and lower surfaces of two young, two middle-aged, and two old leaves per plot; (2) estimating percent of petiole covered with powdery mildew on those leaves; and (3) rating overall health of vines in the plot. Severity on leaves and petioles was recorded using the Horsfall-Barratt scale, and the overall health of vines was rated on a scale from 9 (no powdery mildew) to 1 (extremely severe powdery mildew). Plant vigor was also rated using a scale of 9 (extremely vigorous) to 1 (very low vigor). Pumpkins were harvested September 10-14. For mini-pumpkins, all fruit were harvested from six plants in each plot; for other varieties the entire plot was harvested. Harvested fruit were graded into marketable orange (rind at least one-half orange), marketable green (full size and starting to turn but less than one-half orange), and cull. Number and weight of pumpkins in each group were recorded and used to calculate average fruit size and percent of total yield in each category. On September 14, harvested pumpkins were evaluated for color, shape, suture depth, uniformity, overall quality, and peduncle length, width, and health. Pumpkins were left in the field and on September 24, peduncle health was rated for five orange pumpkins per plot, using a scale of 5 (solid throughout length) to 1 (collapsed and disintegrating over half the length). On September 24 and 25, individual weight, height, and diameter were recorded for five pumpkins of a typical size, one small, and one large pumpkin in two replications of the plots treated for powdery mildew (data not shown).

For the replicated trial analyses of variance were used to test for main effects and interactions when appropriate, followed by mean separation using Fisher's protected least significant difference. Yield and yield components were analyzed separately for jack-o-lanterns, mini-pumpkins, and the pie pumpkin. Disease ratings, vine vigor, and peduncle health ratings were analyzed for all varieties combined. Horsfall-Barratt ratings were converted to percentages. The average of, and the difference between percentages on upper and lower leaf surfaces were calculated; plot means for those and for petiole ratings were used in analysis. Peduncle and fruit quality ratings did not meet assumptions for analysis of variance, so treatment means and standard errors are presented.

Results and Discussion

The growing season was drier and cooler than normal. Indiana Crop and Weather Reports from USDA NASS reported 1,774 growing degree days (GDD) from June 9 through September 13, 188 fewer than normal. Rainfall during that period total 11.0 inches, 1.8 inches below normal. Plants were smaller than usual in trials conducted at this location.

Powdery Mildew Severity, Vine Vigor, and Peduncle Health

Powdery mildew leaf coverage in early September averaged 30% in plots that received fungicide treatments and 73% in plots that did not (Table 1); the difference was statistically significant. Varieties differed in resistance to powdery mildew, but significant differences were detectable only between varieties near the top and bottom of the range. In treated plots, Mustang had the lowest amount of powdery mildew at 15%, but did not have significantly less than RPX 1626, Gold Challenger, Gold Dust, Gold Medal, Gold Speck, or Munchkin. In untreated plots, Spartan had the most powdery mildew at 86%, but differed significantly only from Diablo, HSR 4721 (since named Corvette PMR), RPX 1626, and Munchkin.

Plots treated for powdery mildew showed a bigger difference between powdery mildew coverage on lower and upper leaf surfaces (lower-upper = 48) than plots not treated for powdery mildew (lower-upper = 21) (Table 1). Better fungicide coverage on upper leaf surfaces than lower leaf surfaces probably explains the larger difference in treated plots. Varieties that showed little or no difference in the amount of powdery mildew on lower and upper leaf surfaces when not sprayed for powdery mildew included Mustang, HSR 4721, Spartan, Solid Gold, and Gold Medal. In plots sprayed for powdery mildew, Mustang showed the least difference between lower and upper leaf surfaces, but not significantly different from HSR 4721, Gold Dust, or Gold Challenger.

Powdery mildew coverage of petioles was heavier in untreated plots (58%) than treated plots (25%) (Table 1). In untreated plots, Mustang had less powdery mildew on petioles than all other varieties, followed by HSR 4721, Diablo, and RPX 1626. In treated plots, Mustang had 3% coverage on petioles, but not significantly less than RPX 1626, Spartan, or Diablo.

The overall ratings for powdery mildew reflected the effectiveness of treatment, averaging 6.9 in treated plots and 3.6 in untreated plots (Table 1). In treated plots, ratings were similar for all varieties. In untreated plots, Gold Speck and HSR 4721 received the highest ratings (least powdery mildew), but were not significantly better than Gold Dust.

These evaluations of powdery mildew susceptibility do not paint a clear picture. The single evaluation date late in the season was not sufficient to clearly identify varieties with strong resistance.

Vine vigor was rated slightly lower in untreated plots (4.7) than treated plots (4.9) (Table 1). Varieties that ranked highest for vine vigor included Gold Medal and 168 (since named Goosebumps II) in treated plots, and RPX 1626 and Gold Medal in untreated plots.

Peduncle health evaluated 2.5 weeks after harvest averaged lower in untreated plots (3.8 on a 1 to 5 scale) than treated plots (4.5) (Table 1). Varieties that showed a difference of at least 1 rating point between treated and untreated plots, indicating that treatment for powdery mildew had an important effect on peduncle health and therefore fruit quality, were Diablo, Gold Challenger, and Solid Gold. Varieties that showed a difference less than or equal to 0.5 rating point between treated and untreated plots included 168, HSR 4721, Mustang, RPX 1626, and Spartan. Varieties that received ratings above the average included Gold Medal, HSR 4721, and RPX 1626 (in both untreated and treated plots), Gold Challenger (in treated plots only) and 168 (in untreated plots only). Varieties with both high peduncle health ratings and little difference between treated and untreated plots were HSR 4721 and RPX 1626.

Yield, Number of Fruit, and Fruit Size

Treatment for powdery mildew did not significantly affect jack-o-lantern yield, fruit number, or average fruit weight (Table 2). Treated plots averaged 11.0 tons and 1,606 marketable orange fruit per acre averaging 13.8 lb. each. Untreated plots averaged 10.6 tons and 1,520 pumpkins per acre, with an average weight of 14.0 lb. Yield of orange plus green pumpkins also did not differ between treated and untreated plots.

Varieties differed somewhat in their response to treatment for powdery mildew (interactions between powdery mildew treatment and cultivar were significant at $P < .15$), but in most cases the difference between treated and untreated plots was not significant (comparisons not shown).

The jack-o-lantern pumpkins ranged in size from 19 lb. (Gold Medal) to 11.5 lb. (RPX 1626), averaged across powdery mildew treatments. Gold Medal and Mustang produced the highest yield in tons per acre of orange pumpkins whether treated or untreated for powdery mildew, averaging 13.9 and 13.6, respectively. These were followed by the varieties HSR 4721, Spartan, and Diablo, which produced similar tons per acre whether treated or untreated for powdery mildew. Solid Gold and Gold Challenger produced the lowest average yields (8.8 and 7.4, respectively), similar to one another whether treated or untreated. RPX 1626 yielded similar to HSR 4721, Spartan, and Diablo when untreated, and similar to Gold Challenger when treated for powdery mildew.

HSR 4721 and Mustang produced the greatest number of orange fruit per acre, 1,983 and 1,863, respectively, averaged across powdery mildew treatments. Spartan, RPX 1626, Diablo, and Gold Medal did not differ significantly in number of orange fruit produced when averaged across powdery mildew treatments. Gold Challenger and Solid Gold produced the fewest orange fruit per acre, 1,258 and 1,219, respectively, although Gold Challenger was not significantly less productive than Gold Medal or Diablo.

Yield of all orange and green fruit in tons and numbers of fruit per acre followed a pattern similar to that for orange fruit.

For the mini-pumpkin varieties yield in tons and number per acre were nearly 25% greater in treated than untreated plots (3.6 vs. 2.9 tons per acre and 15,852 vs. 11,806 fruit per acre); the differences were marginally significant at $P < .10$. Average weight of mini pumpkins was about 10% greater in untreated plots than treated plots (0.50 lb. vs. 0.45 lb.). The three mini-pumpkins did not differ in yield or fruit number per acre. Averaged across powdery mildew treatments, Gold Dust was the largest (0.56 lb.), Munchkin in middle (0.47 lb.), and Gold Speck the smallest (0.4 lb.).

The single variety classed as a 'pie' type, 168 (Goose Bumps II), had similar yields in treated and untreated plots, but average fruit weight was 0.4 lb. greater in treated plots (6.1 vs. 5.7 lb.).

These results are similar to those of the 2008 trial at this location, when yield and fruit size of the September harvest were not influenced by powdery mildew treatment. In 2008, there was a larger effect on fruit harvested in October. In this trial only one harvest was made, and after that there was little fruit remaining for a later harvest due to the cool growing season.

Fruit Characteristics

Observations on fruit shape, color, peduncle (stem) length and width, fruit uniformity, and overall fruit appearance are shown in Table 3. In most instances, numerical ratings did not differ significantly in plots treated or not treated for powdery mildew, so averages across treatments are presented. Jack-o-lantern varieties rated most uniform were Diablo and HSR 4721. Jack-o-lantern varieties that received ratings for overall fruit appearance of 6.5 or above included Diablo, HSR 4721, and Spartan.

Observation Trial

Fruit characteristics, yield, and average fruit size for the unreplicated trial are presented in Tables 3 and 4. Yield of jack-o-lanterns in the unreplicated plots was 11.6 tons and 1,594 orange fruit per acre — similar to the average of the replicated plots treated with fungicide. Five experimental lines from Harris Moran ranged in average fruit weight from 14.6 to 19.8 lb. Rock Star (16.9 lb.) and Warlock (16.4 lb.) were similar in size and produced similar yield of orange

fruit (12.2 and 11.8 tons per acre, respectively). Expert averaged 14.1 lb. and 9.7 tons per acre. Magic Lantern, Magic Wand, and New Rocket ranged from 11.4 to 12.4 lb. average fruit weight, and 10.2 to 12.1 tons per acre. Magic Lantern and Magic Wand, along with HMX 8694 were notable because all fruit harvested was more than half orange — there were no mature pumpkins on the vine that had begun to turn but were still more than half green. Charisma PMR was the smallest of the jack-o-lantern pumpkins, at 9.6 lb., and produced 8.3 tons per acre of orange fruit.

Lil' Orangemon is a mini-pumpkin. This squat, deeply-ribbed fruit was dappled cream and orange, averaged 1.3 lb. per fruit, and produced 13,137 fruit and 8.8 tons per acre.

Three pie pumpkins included Field Trip, Gargoyle, and SSX 5078. Field Trip produced squat, 3-4 lb. fruit with long stems. Gargoyle produced round, 3-4 lb. fruit with a few warts. SSX 5078 produced round, 5-5.5 lb. fruit; about 20% of the fruit were less than half orange at the time of harvest.

One specialty pumpkin was included: Flat White Boer Ford. This is the species *Cucurbita maxima*. As the name suggests, the fruit is very squat and whitish, averaging 11.7 lb., but with some as small as 2.2 lb. and others as large as 20.2 lb. or more. Typical fruit are 11 inches across and 4.5 inches tall. The vines were very vigorous. This variety shows promise as a decorative squash.

Summary

Fungicide treatments for powdery mildew significantly reduced the amount of disease present on leaves and petioles near harvest time in early September. Varieties differed in the amount of disease, but the single evaluation date late in the season was not sufficient to clearly identify varieties with superior resistance.

Statistically significant differences in jack-o-lantern yield, fruit number, or average fruit size due to fungicide treatment for powdery mildew were not found. There is good indication that for some varieties fungicide treatment improved peduncle quality, but for others it did not.

The results presented here provide yield and descriptive information for pumpkin varieties, including several that are recently introduced, older varieties, and experimental lines. Combined with results from trials in other locations and years this information should help producers choose cultivars most suitable for their operations.

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Table 1. Powdery mildew severity on leaves and petioles, overall powdery mildew rating, vine vigor, and peduncle health for pumpkin varieties grown with (Yes) and without (No) fungicide treatment to protect from powdery mildew, Wanatah, Indiana 2009^z.

Variety	Percent Powdery Mildew Coverage ^y						Overall Powdery Mildew Rating ^x		Vine Vigor Rating ^x		Peduncle Health ^w	
	Average of Lower and Upper Leaf Surfaces		Difference Between Lower and Upper Leaf Surfaces		Petiole		No	Yes	No	Yes	No	Yes
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
168	73 abcd	37 fg	22 hij	65 a	70 a	31 cdef	2.7 fg	7.3 a	5.7 bcd	6.3 abc	4.1 ± 0.13	4.3 ± 0.18
Diablo	70 bcd	34 fg	28 fghi	63 ab	44 bc	16 fgh	3.7 ef	7.0 a	4.0 efg	4.0 efg	3.5 ± 0.18	4.5 ± 0.24
Gold Challenger	81 ab	25 gh	21 hij	43 cdefg	73 a	24 efg	2.0 g	6.7 ab	4.3 defg	4.0 efg	3.7 ± 0.18	4.8 ± 0.00
Gold Dust	74 abcd	26 gh	28 fghi	41 cdefg	74 a	26 defg	5.0 cd	6.7 ab	4.3 defg	4.0 efg	—	—
Gold Medal	76 abc	30 gh	13# ij	54 abcd	68 a	41 bcd	2.7 fg	7.0 a	7.0 ab	7.7 a	4.0 ± 0.31	4.7 ± 0.18
Gold Speck	72 abcd	27 gh	35 efgh	44 bcdef	71 a	35 bcde	5.3 bc	7.3 a	3.7 fg	4.7 def	—	—
HSR 4721	69 bcd	33 fg	9# j	36 defg	30 cdef	19 fg	5.3 bc	7.0 a	4.3 defg	4.7 def	4.1 ± 0.07	4.6 ± 0.12
Munchkin	59 de	30 gh	53 e	52 abcde	66 a	36 bcde	4.0 de	7.0 a	3.7 fg	4.3 efg	—	—
Mustang	76 abc	15 h	8# j	24 g	13 gh	3 h	3.7 ef	6.5 ab	4.3 defg	5.0 cde	3.5 ± 0.07	4.0 ± 0.12
RPX 1626	61 cde	23 gh	15 ij	45 bcdef	48 b	12 gh	3.7 ef	7.3 a	7.3 a	5.0 cde	4.7 ± 0.07	4.8 ± 0.20
Solid Gold	79 ab	46 df	13# ij	49 abcde	69 a	42 bc	2.7 fg	6.3 abc	4.3 defg	5.0 cde	2.7 ± 0.35	4.5 ± 0.07
Spartan	86 a	36 fg	10# ij	58 abc	66 a	15 gh	2.7 fg	6.7 ab	3.3 g	4.0 efg	3.5 ± 0.24	4.0 ± 0.46
<i>Average</i>	73**	30	21†	48	58**	25	3.6**	6.9	4.7*	4.9	3.8	4.5

^zValues are means of three replications. †, *, and ** indicate significant difference between mean of treated and untreated plots at $P \leq .10$, .05 and .01, respectively. Means within a column followed by the same letter do not differ significantly at $P \leq .05$ according to Fisher's protected LSD. # indicates difference between lower and upper leaf surfaces not significantly different from 0.

^yPercentage of leaf surface or petiole covered with powdery mildew on September 5-7 based on two young, two middle-aged, and two old leaves per plot. Field observations recorded using Horsfall-Barratt scale were transformed to percentages using midpoints of the scale before analysis.

^xOverall powdery mildew severity and vine vigor in each plot rated September 5-7 on a scale of 1-9, with 1=extremely severe powdery mildew and 9=no powdery mildew, and 1=very low vigor and 9=extremely high vigor.

^wAverage peduncle health rating for five orange fruit per plot on September 24 using a 1 to 5 scale, with 5=peduncle solid throughout length; 4=peduncle pliable up to a third of its length; 3=peduncle pliable for more than half its length, but not shriveled; 2=peduncle pliable and shriveled for most of its length; 1=peduncle collapsed and disintegrating over most of length. Mean ± standard error. No ratings made for mini-pumpkins.

Table 2. Average fruit weight, number of fruit, and yield of pumpkin varieties grown with (Yes) and without (No) fungicide treatment to protect from powdery mildew, Wanatah, Indiana 2009^z.

Variety	Seed Source ^y	Stand Plants/A	Marketable Orange Fruit ^x						Marketable Orange and Green Fruit ^x			
			No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
			Lb./frt.		No./A		Tons/A		No./A			Tons/A
Jack-o-lanterns												
Diablo (5061)	SK	1,373	13.2	15.0	1,460	1,498	9.7	11.2	1,498	1,498	9.9	11.2
Gold Challenger	RU	1,344	12.2	11.6	1,114	1,402	6.8	8.1	1,133	1,402	6.9	8.1
Gold Medal	RU	1,383	19.0	18.9	1,440	1,498	13.7	14.1	1,440	1,537	13.7	14.4
HSR 4721	HL	1,383	11.9	12.0	1,921	2,036	11.4	12.2	2,017	2,074	11.9	12.3
Mustang (4710)	SI	1,383	14.5	14.6	1,825	1,901	13.2	13.9	1,825	1,921	13.2	14.0
RPX 1626	RU	1,373	12.7	10.3	1,786	1,440	11.4	7.5	1,844	1,517	11.8	8.1
Solid Gold	RU	1,268	15.1	14.2	999	1,440	7.4	10.2	1,018	1,479	7.6	10.6
Spartan	SW	1,383	13.7	13.5	1,613	1,633	11.1	10.9	1,613	1,633	11.1	10.9
Average		1,361	14.0	13.8	1,520	1,606	10.6	11.0	1,549	1,633	10.7	11.2
LSD .05 ^w			1.7		315		2.2		309		2.2	
Mini Pumpkins												
Gold Dust	RU	1,383	0.62	0.50	11,908	16,364	3.7	4.1				
Gold Speck	RU	1,364	0.40	0.40	13,214	14,213	2.6	2.9				
Munchkin	RU	1,258	0.49	0.45	10,295	16,978	2.5	3.8				(no green fruit)
Average		1,306	0.50*	0.45	11,806 [†]	15,852	2.9 [†]	3.6				
LSD .05 ^w			0.04		ns		ns					
Pie Pumpkins (Warted)												
168	SI	1,364	5.7*	6.1	2,785	2,343	8.0	7.1	2,785	2,458	8.0	7.5

^zValues are means of three replications. † and * indicate significant difference between mean of treated and untreated plots at $P \leq .10$ and $.05$, respectively. Per acre values calculated by multiplying plot values by number of plots per acre.

^yHL=Hollar, RU=Rupp, SI=Sieggers, SK=Sakata, SW=Seedway.

^xMarketable orange fruit includes all firm fruit at least one-half orange. Marketable orange and green includes all firm fruit of mature size and starting to turn orange by September 14.

^wWithin a size grouping (jack-o-lantern or mini), variety means within a column differing by more than this amount are significantly different at $P \leq .05$ according to Fisher's protected LSD. ns=not significant.

Table 3. Fruit characteristics of pumpkins grown in Wanatah, Indiana 2009^z.

Variety	Color ^y	Shape ^y	Sutures ^y	Peduncle ^y		Uniform ^y	Overall ^y
				Length	Width		
Replicated Trial — Jack-o-lanterns							
Diablo (5061)	M-D	R	M-D	5.3±0.2	6.3±0.2	7.5±0.2	7.5±0.3
Gold Challenger	M	R-O	M	4.7±0.3	6.5±0.2	5.7±0.5	5.2±0.7
Gold Medal	M-D	V	M-D	4.7±0.2	7.2±0.2	3.7±0.2	6.2±0.3
HSR 4721	L	R-O	S	5.0±0.0	6.2±0.3	7.3±0.2	6.7±0.3
Mustang (4710)	M-L	O	S	4.7±0.2	5.2±0.3	6.3±0.2	5.5±0.3
RPX 1626	L-M	R-O	S-M	4.5±0.2	5.7±0.2	5.0±0.4	4.8±0.2
Solid Gold	M	R-O	S	5.5±0.2	6.0±0.3	6.0±0.4	5.3±0.7
Spartan	M-D	R-O	M	3.3±0.2	4.7±0.2	6.7±0.2	6.7±0.3
Replicated Trial — Mini and Pie Pumpkins							
Gold Dust	M	S	D	6.7±0.3	3.0±0.0	7.7±0.3	6.0±0.0
Gold Speck	M	S	D	7.3±0.3	3.0±0.0	8.0±0.0	6.0±0.0
Munchkin	M	S	D	4.8±0.3	3.0±0.0	8.0±0.0	6.0±0.0
168	D	S-R	S	7.0±0.3	4.0±0.0	6.7±0.2	7.0±0.0
Observation Trial — Jack-o-lanterns							
Charisma PMR	D	S-R	D	5	4	7	8
Expert	D	O	D	5	5	6	8
HMX 8693	D	O	M	6	4	7	7
HMX 8694	D	O-T	M-D	5	5	7	8
HMX 8695	D	R-O	M	4	6	5	6
HMX 9680	D	R-O	S	4	7	5	5
HMX 9699	D	R-O	S	4	7	4	5
Magic Lantern	D	R-O	M	5	5	5	6
Magic Wand	M	O	M-D	5	7	6	7
New Rocket	D	R-O	M	5	5	8	8
Rock Star	D	S	D	4	6	7	8
Warlock	D	R-O	S	4	7	6	6
Observation Trial — Mini, Pie, and Specialty Pumpkins							
Lil Orangemon	MT	S	D	8	3	7	8
Field Trip	M	S	M	7	5	7	8
Gargoyle	M	R	S	5	7	8	7
SSX 5078	M	R	S	5	4	8	7
Flat White Boer Ford	white	very S	M	5	4	6	7

^zObservations of harvested fruit made on September 14 for six plots of each cultivar in replicated trial and on September 18 for one plot of each cultivar in observation trial.

^yFruit color: D=dark, M=medium, L=light orange, MT=multi-colored. Shape: S=squat, R=round, O=oblong, V=variable. Sutures: S=shallow, M=medium, D=deep. Peduncle length and width, fruit uniformity, and overall fruit quality rated on a 1-9 scale, with 2=short/thin/ peduncle, non-uniform, poor quality; 5=average; 8=extra long/extra thick/dark green solid peduncle, very uniform, high quality.

Table 4. Average fruit weight, number of fruit, and yield of pumpkin varieties grown in unreplicated plots in Wanatah, Indiana 2009^z.

Variety	Seed Source ^z	Stand	Marketable Orange Fruit ^y			Marketable Orange and Green Fruit ^y	
		Plants/ A	Lb./frt.	No./A	Tons/A	No./A	Tons/A
Jack-o-lanterns							
Charisma PMR	JS	1,383	9.6	1,729	8.3	2,017	10.5
Expert	JS	1,383	14.1	1,383	9.7	1,786	13.4
HMX 8693	HM	1,268	15.8	1,786	14.1	1,844	14.9
HMX 8694	HM	749	14.6	1,037	7.6	1,037	7.6
HMX 8695	HM	1,383	17.0	1,556	13.3	1,613	14.2
HMX 9680	HM	1,037	19.8	1,383	13.7	1,613	17.5
HMX 9699	HM	1,268	18.4	1,613	14.9	1,844	17.8
Magic Lantern	HM	1,383	12.4	1,959	12.1	1,959	12.1
Magic Wand	HM	1,383	11.4	1,786	10.2	1,786	10.2
New Rocket	JS	1,383	11.8	2,017	11.9	2,190	13.4
Rock Star	JS	1,383	16.9	1,440	12.2	1,901	18.0
Warlock	HM	1,383	16.4	1,440	11.8	1,556	13.3
<i>Average</i>		<i>1,282</i>	<i>14.9</i>	<i>1,594</i>	<i>11.6</i>	<i>1,762</i>	<i>13.6</i>
Mini Pumpkin							
Lil Orangemon	HM	1,383	1.3	13,137	8.8	13,137	8.8
Pie Pumpkins							
Field Trip	HM	1,383	3.8	4,379	8.4	4,379	8.4
Gargoyle	HM	1,383	3.5	3,803	6.6	3,860	6.6
SSX 5078	SK	1,383	5.2	3,630	9.4	4,552	13.3
<i>Average</i>		<i>1,383</i>	<i>4.2</i>	<i>3,937</i>	<i>8.1</i>	<i>4,264</i>	<i>9.4</i>
Specialty Pumpkin							
Flat White Boer Ford	SK	1,383	11.7	2,478	14.5	2,478	14.5

^zHM=Harris Moran, JS=Johnny's Selected Seeds, SK=Sakata.

^yMarketable orange fruit includes all firm fruit at least one-half orange. Marketable orange and green includes all firm fruit of mature size and starting to turn orange by September 14. Per acre values calculated by multiplying plot values by number of plots per acre.