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Supersweet Sweet Corn Cultivar Evaluation for Northern Indiana, 2009

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Indiana growers harvested sweet corn for fresh market sales from 5,400 acres in 2008, with an average yield of 70 cwt/A (166 crates or 3.5 tons per acre) and total value of $11.7 million (USDA-NASS Indiana Agricultural Statistics, 2008-2009). Indiana ranks 17th among states for production of fresh market sweet corn. The 2007 USDA Ag Census reported 603 Indiana farms producing sweet corn for fresh markets and 51 farms selling to processors. Sweet corn fields for fresh market sales are located throughout the state. In northern Indiana, bicolor corn is most commonly grown. Varieties with improved eating quality are of interest to both producers and consumers. Producers are also interested in yield, ear size, appearance, and agronomic characteristics. This paper reports on 18 supersweet (sh2) sweet corn cultivars and experimental lines that were evaluated at the Pinney-Purdue Agricultural Center in Wanatah, Indiana.

Materials and Methods

The trial was conducted on a Tracy sandy loam. The fall 2008 soil test showed 1.2% organic matter, pH 6.4, and 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, we applied 20, 30, and 45 lb./A N, P_2O_5, and K_2O, plus 7.8 lb./A S and 0.8 lb./A Zn. In spring 2009. wheat was treated on May 1 with glyphosate and worked in on May 8 and 11. Fertilizer (200 lb./A 6-24-24) was broadcast to provide 12 lb. N, 48 lb. P_2O_5, and 48 lb. K_2O per acre. The trial was set up as a randomized complete block design with three replications. Cultivars were assigned to individual plots one row wide (30 inches) by 30 feet long. Corn was seeded May 19, 2009, with a finger pick-up planter set to drop 23,200 seeds per acre, and later thinned to 35 plants per 30-foot row (20,328 plants per acre). N (at 20.3 lb./A) and P (at 18.2 lb./A P_2O_5) were applied at planting from 19-17-0 (10 gal. /A), and an additional 70 lb./A N from urea ammonium nitrate solution was injected June 22. Tefluthrin (Force 3G) was applied at planting to control corn rootworms. Weeds were controlled with atrazine (Atrazine 4L) and s-metolachlor (Dual II Magnum) applied and incorporated before seeding, cultivation, and hand weeding. Irrigation was applied during the growing season as needed. Insecticides were applied as needed to control caterpillars. Emergence was recorded 10 and 24 days after planting (DAP), before thinning. Early plant vigor was evaluated 31 DAP. Just before harvest, at 78 DAP, plant vigor, height, and degree of tiller formation were evaluated, and the height from the soil to the middle of the ear was measured for three ears per plot. Each plot was harvested when corn reached marketable stage. The weights and numbers of marketable ears were recorded. Three ears from each plot were selected to evaluate degree of husk cover, husk tightness, degree of tip fill, overall attractiveness, shank length, and average ear diameter and length after husking. One person rated the flavor of each entry. Rating scales are described below and in the table footnotes. Quantitative data with equal variance across treatments were analyzed using ANOVA followed by mean separation using Fisher's protected least significant difference at $P \leq 0.05$. Relationships between yield components, ear and plant characteristics, and average days to harvest were analyzed using linear regression.

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Characteristic	Rating Scale
Husk Cover	5=more than 2 inches cover. 4=1.25-2 inches. 3=0.75-1.25 inches. 2=less than 0.75 inch. 1=ear exposed.
Husk Tightness	3=tight. 2=firm. 1=loose.
Tip Fill	5=kernels filled to tip of cob. 4=less than 0.5 inch unfilled. 3=0.5-1 inch unfilled. 2=more than 1 inch unfilled. 1=more than 2 inches unfilled.

Results and Discussion

The growing season was drier and cooler than normal. Indiana Crop and Weather Reports from USDA-NASS reported 1,628 growing degree days (GDD) from May 18 to August 16, 134 fewer than normal. Rainfall during that period totaled 7.27 inches, 4.43 inches below normal.

Emergence 10 DAP averaged 85% of the intended seeding rate and changed little over the next 10 days. Seven varieties had more than 87% emergence and did not differ significantly from Legion, which had the highest at 103% (Table 1). Five varieties had emergence less than 83%, not significantly different from Fantastic, the lowest at 68%. Differences in early vigor were reflected in scores ranging from 3 (Fusion) to 8 (Legion) on the 9-point rating scale (Table 1). In addition to Legion, six varieties received ratings more than the average of 5.8: 2171, 2170, 274A, Ravelin, and HMX 8346S. Cultivars with early vigor less than 5 included Optimum, HMX 7368D, and Fusion. Plant vigor near harvest spanned a smaller range, from 4.3 to 5.7, and did not necessarily correspond to early vigor. Most varieties consistently produced tillers, except Attraction, which had few or none. BSS 0982 consistently produced long tillers (Table 1).

Results for yield and ear quality are presented in Table 2. Marketable yield averaged 7.0 tons per acre. Awesome produced the highest yield, 8.5 tons per acre, but 274A, Fusion, Legion, and HMX 83465S did not differ significantly. These four varieties also did not differ significantly from 11 others. CSABF4-157 produced the lowest yield per acre: 4.3 tons. The number of marketable ears ranged from 1,000 to 1,646 dozen per acre, and averaged 1,443. Eleven varieties produced more than 1,452 dozen per acre, including Ravelin, Optimum, 2673, BSS 0982, 2171, Bueno GFJ, Awesome, HMS 8346S, HMX 8343 S, HMX 7368D, and Legion. CSABF4-157 produced the fewest ears per acre. The number of ears produced was correlated with actual days to harvest.

Average weight per ear ranged from 0.71 lb. (CSABF4-157) to 0.98 lb. (Fusion) (Table 2). Fusion and 274A had the largest ears by weight, while six varieties were less than 0.77 lb. and did not differ significantly from CSABF4-157. Ear length ranged from 6.8 to 8.1 inches, and diameter ranged from 1.8 to 2.0 inches. The longest ears were produced by 2170, 274A, and Ravelin (7.8 to 8.1 inches). The shortest ears ranged from 6.8 to 7.2 inches and included HMX 7376D, HMX 8346S, Attraction, 2171, and 2673. Varieties with ears 1.9 inches or more in diameter included 2573, 274A, Attraction, Awesome, BSS 0982, Fantastic, Fusion, HMX 7368D, HMX 8346S, and Optimum. CSABF4-157, HMX 8343S, and Legion had ears less than 1.8 inches wide. Shank length ranged from 3.3 inches to 5.2 inches and averaged 4.1 inches (Table 1). Varieties with the longest shanks included Awesome, Legion, 2573, and Fantastic (4.4 to 5.2 inches). Varieties with the shanks less than the average included HMX 7368D, CSABF4-157, Bueno GFJ, 2171, HMX 8346S, 274A, Attraction, 2673, and Ravelin. Ear height, measured from the ground to mid-ear, ranged from 21.6 inches for 274A, to 32.1 inches for Legion and was correlated with harvest date — later varieties tended to have higher ears.

Husk cover ratings averaged 3.3 (Table 2). Six varieties averaged 4 or better, indicating at least 1.25 inches of husk cover: 2170, Optimum, Bueno GFJ, BSS 0982, Fusion and HMX 7368D. Four varieties, CSABF4-157, 2673, HMX 83443S, and Legion, averaged below 2.5, indicating most ears with less than 0.75 inches of husk cover. The husks of Fantastic, CSABF4-157, 2573, Fusion, and Legion were loose around the ear tip. Tip fill ratings averaged 4.8, and no varieties received a rating below 4, indicating no varieties had more than ½ inch of unfilled tip. For overall ear quality in terms of appearance, Fusion and HMX 8346S received the highest ratings. Other varieties above the 6.1 average included 2171, 2170, Fantastic, Optimum, Bueno GFJ, Awesome, Ravelin, and HMX 7368D. CSABF4-157 2573, and Legion received the lowest ratings for overall appearance.

Varieties that consistently received flavor ratings of very good to excellent or better included 2573, Attraction, HMX 8346S, and HMX 7368D (Table 2). Varieties consistently noted to have a tough or very tough pericarp included Fusion, Legion, and Ravelin (data not shown).

Often producers select one or two varieties in each maturity range, so it is helpful to compare varieties of similar maturity. Among the five bicolor varieties harvested 79 to 80 DAP, 2171 produced more marketable ears per acre than Fantastic or CSABF4-157; and 2170 and 274A produced ear numbers in between 2171 and Fantastic. Among these five varieties, 2170 and 274A had the longest ears and 2171 the shortest. Husk cover and tightness tended to be better for 2170 than for the other early varieties. Six bicolor varieties were harvested 81 to 83 DAP. The most productive, HMX 8343S, produced significantly more marketable ears per acre than the least productive, 2573. Awesome, Bueno GFJ, 2673, and Optimum didn't differ significantly from either HMX 8343S or 2573. Ear length for this group ranged from 7.2 to 7.6 inches. Optimum, Bueno GFJ, and Awesome were judged to have better husk cover and tighter husks than the other three varieties in this maturity range. Of the four bicolor varieties harvested 84 or more days after planting, Legion produced significantly more marketable ears per acre than Fusion, and BSS 0982 and Attraction were in the middle. Attraction had the shortest ears in this group at 6.9 inches; the other three had ears 7.3-7.5 inches long. Legion had the narrowest ears of this group. Fusion and BSS 0982 had good to very good husk cover and Attraction had acceptable husk cover, while husk cover for Legion was only fair. Three yellow varieties were harvested 80 to 84 DAP: Ravelin, HMX 8346S, and HMX 7368D. They didn't differ significantly in number of marketable ears produced. Ears of Ravelin averaged nearly an inch longer than ears of the HMX lines. Husk cover was acceptable on all three varieties, but better on the HMX lines than on Ravelin.

Careful evaluation of results presented in Tables 1 and 2 combined with results from other locations and years should aid producers in selecting varieties best suited to their operations.

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Table 1. Emergence, final stand, early and late plant vigor, tillering, plant height, and ear shank length for 18 supersweet sweet corn varieties in northern Indiana, 2009. Varieties listed in order of harvest date within color.

Cultivar	Emergence[z]	Final Stand	Plant Vigor[y]		Tillers[x]	Height Class[w]	Shank Length[v]
		plants/A	June 19	Aug. 5			
2171	88	20,134	7.0±0.0	4.7±0.7	2.7±0.3	2.0±0.0	3.8
2170	85	19,554	6.3±0.7	4.3±0.3	3.0±0.6	2.0±0.0	4.1
274A	83	18,392	7.7±0.9	5.0±0.0	2.3±0.3	1.7±0.3	4.0
Fantastic	68	16,069	5.7±1.2	4.7±0.3	3.3±0.9	2.0±0.0	4.4
CSABF4-157	84	18,005	5.7±0.7	4.3±0.3	2.0±0.6	1.3±0.3	3.3
2573	71	17,811	5.0±0.0	5.0±0.0	3.0±0.0	2.0±0.0	4.5
Optimum	92	19,941	4.7±0.3	5.0±0.0	3.7±0.3	2.7±0.3	4.1
2673	89	19,941	5.7±0.9	5.0±0.0	3.3±0.3	2.0±0.0	4.0
Bueno GFJ	83	19,360	5.3±0.9	4.7±0.3	3.7±0.3	3.0±0.0	3.6
Awesome	88	19,941	5.7±0.7	5.3±0.3	2.7±0.3	1.7±0.3	5.2
HMX 8343S	93	20,328	5.3±0.9	5.7±0.3	3.0±0.6	2.3±0.3	4.4
Attraction	78	18,198	5.3±0.9	5.3±0.3	1.3±0.3	1.7±0.3	4.0
BSS 0982	87	19,554	5.3±0.9	4.7±0.3	4.3±0.3	3.0±0.0	4.2
Fusion	72	16,843	3.0±0.0	5.7±0.3	2.3±0.3	2.7±0.3	4.3
Legion	103	20,328	8.0±0.0	5.7±0.9	1.7±0.3	3.0±0.0	5.0
Ravelin	84	19,360	7.0±0.6	4.3±0.3	3.0±0.0	2.0±0.0	4.1
HMX 8346S	101	20,328	6.7±0.9	5.7±0.3	3.0±0.6	3.0±0.0	4.0
HMX 7368D	85	20,328	4.7±0.3	5.7±0.3	2.7±0.3	2.3±0.3	3.3
Grand Mean	*85*	*19,134*	*5.8*	*5.0*	*2.8*	*2.2*	*4.1*
LSD .05[u]	*16*	–	–	–	–	–	*0.8*

[z]Percentage of intended seeding rate (23,200 seeds per acre). Planted May 19, 2009, emergence data May 29.
[y]1=very weak, 5=average, 9=very vigorous. Mean ± standard error.
[x]1=no or very few tillers, 3=tillers common but not tall enough to interfere with harvest, 5=tillers tall enough to interfere with harvest on most plants. Mean ± standard error.
[w]1=less than 5 feet, 2=5 to 6 feet, 3=more than 6 feet. Mean ± standard error.
[v]Measured from attachment to stalk to base of ear; average of three ears per replication.
[u]Means differing by more than this amount are significantly different at $P \leq .05$ based on Fisher's Protected LSD. – AOV not performed.

Table 2. Yield, ear size, and quality of supersweet and augmented supersweet sweet corn in northern Indiana, 2009. Varieties listed in order of harvest date within color.

Cultivar	Seed Source[z]	Color	Days to Harvest[y]		GDD to Harvest[x]	Yield of Marketable Ears		Avg. Ear Weight *lb*	Ear Length *in*	Ear Dia. *in*	Ear Ht. *in*	Husk Cover[w]	Husk Tight-ness[w]	Tip Fill[w]	Over-all[w]	Flavor[v]
			Pred.	Actual		*doz/A*	*ton/A*									
2171	ST	BI	71	79	1,379	1,516	6.9	0.75	7.1	1.9	24	3.0±0.2	1.7±0.2	4.9±0.1	6.3±0.3	VG-G
2170	RU	BI	71	80	1,394	1,339	7.0	0.87	8.1	1.9	25	4.1±0.3	1.9±0.3	4.8±0.2	6.7±0.3	VG
274A	ST	BI	74	80	1,394	1,355	7.7	0.96	7.9	2.0	22	2.8±0.5	1.3±0.3	5.0±0.0	6.0±1.0	VG-G
Fantastic	ST	BI	75	80	1,394	1,275	6.9	0.91	7.5	1.9	24	2.7±0.2	1.6±0.1	4.9±0.1	6.7±0.3	VG-G
CSABF4-157	CR	BI	–	80	1,394	1,000	4.3	0.71	7.7	1.8	23	2.0±0.0	1.1±0.1	5.0±0.0	4.0±0.0	VG
2573	RU	BI	73	81	1,410	1,355	6.5	0.79	7.3	1.9	23	2.9±0.4	1.4±0.3	5.0±0.0	4.7±0.7	VG-E
Optimum	CR	BI	78	81	1,410	1,468	6.7	0.77	7.6	1.9	24	4.0±0.2	2.2±0.4	4.9±0.1	7.0±0.0	VG
2673	RU	BI	73	82	1,437	1,468	6.8	0.77	7.2	2.0	22	2.3±0.7	1.6±0.3	4.9±0.1	5.3±1.3	E-G
Bueno GFJ	CR	BI	84	82	1,437	1,533	7.3	0.79	7.5	1.9	25	4.0±0.2	2.2±0.4	4.8±0.1	6.7±0.3	E-G
Awesome	SW	BI	74	83	1,464	1,565	8.5	0.91	7.4	2.1	23	3.7±0.2	2.3±0.5	5.0±0.0	7.0±0.0	VG
HMX 8343S	HM	BI	75	83	1,464	1,630	7.3	0.75	7.6	1.8	31	2.4±0.3	1.8±0.2	4.8±0.2	5.0±0.6	VG-G
Attraction	RU	BI	76	84	1,490	1,371	6.8	0.82	6.9	2.0	23	3.2±0.3	2.0±0.5	4.8±0.1	5.0±1.0	VG-E
BSS 0982	SY	BI	80	84	1,490	1,484	7.1	0.80	7.3	2.0	25	4.1±0.2	2.1±0.1	4.6±0.1	6.0±0.6	VG
Fusion	RU	BI	75	85	1,508	1,307	7.7	0.98	7.4	2.0	23	4.7±0.2	1.4±0.3	4.8±0.1	7.7±0.3	VG
Legion	SY	BI	79	87	1,543	1,646	7.4	0.75	7.5	1.8	32	2.4±0.4	1.3±0.3	4.3±0.2	4.7±0.3	G
Ravelin	SY	Y	72	80	1,394	1,452	6.8	0.78	7.8	1.9	27	3.0±0.2	2.0±0.0	4.2±0.2	7.0±0.6	G-VG
HMX 8346S	HM	Y	75	84	1,490	1,581	7.4	0.78	6.9	1.9	29	3.6±0.2	1.9±0.3	5.0±0.0	7.7±0.3	VG-E
HMX 7368D	HM	Y	77	84	1,490	1,630	7.2	0.74	6.8	2.0	30	4.1±0.3	1.9±0.1	4.9±0.1	6.3±0.7	E-VG
Grand Mean						*1,443*	*7.0*	*0.81*	*7.4*	*1.9*	*25*	*3.3*	*1.8*	*4.8*	*6.1*	–
LSD .05[u]						*231*	*1.2*	*0.06*	*0.4*	*0.08*	*2.6*	–	–	–	–	–
r^{2}[t]						*0.23*	*ns*	*ns*	*ns*	*ns*	*0.28*	–	–	–	–	–

[z]Seed ource: CR=Crookham, HM=Harris Moran, RU=Rupp, ST=Stokes, SW=Seedway, SY=Syngenta.
[y]Days from planting to harvest. Predicted number is from seed supplier.
[x]GDD=corn growing degree days.
[w]Husk cover, tip fill: 1=worst, 5=best. Husk tightness: 1=loose, 3=very tight. Overall: 1=worst, 9 =best. Mean ± standard error.
[v]Flavor: F=fair, G=good, VG=very good, E=excellent. Summary of ratings by one person for three ears per cultivar.
[u]Means differing by more than this amount are significantly different at $P \leq .05$ based on Fisher's Protected LSD. – AOV not performed.
[t]r^2 for regression vs. actual days to harvest is the proportion of variability explained by days to harvest. ns=regression not significant at $P \leq .05$.