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Supersweet Sweet Corn Cultivar Evaluation for Northern Indiana, 2008

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Indiana growers harvested sweet corn for fresh market sales from 5,400 acres in 2007, according to the Indiana Agricultural Statistics Service. Average yield was 85 cwt/A (202 crates/A) and the crop had a total value of \$10.5 million. Sweet corn fields 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 15 sweet corn cultivars with sh2 endosperm, including varieties described as supersweet and augmented supersweet, that were evaluated at the Pinney-Purdue Agricultural Center in Wanatah, Indiana.

Materials and Methods

The trial was conducted on a Tracy sandy loam with 1.5% organic matter and 32 ppm phosphorus (P), 92 ppm potassium (K), 155 ppm magnesium (Mg), 600 ppm calcium (Ca), and pH 6.2. It was set up as a randomized complete block design with three replications. Cultivars were assigned to individual plots one row (30 inches) wide by 30 feet long. Corn was seeded May 23, 2008, 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). Nitrogen (N) (20.3 lb./A) and P (18.2 lb./A P₂O₅) 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 24. Tefluthrin (Force 3G) was applied at planting to control corn rootworms. Weeds were controlled with atrazine (Atrazine 4L) and s-metolachlor (Dual II Magnum), which were applied after seeding, and hand weeding. Irrigation was applied to incorporate herbicides, and then during the growing season as needed. Insecticides were applied as needed to control caterpillars. Emergence was recorded 11 and 19 days after planting (DAP), before thinning. Early plant vigor was evaluated 25 DAP. At 31 DAP the number of plants exhibiting leaves tightly wrapped in the whorl (onion-leaving) and the number leaning over were counted. Seventy-six DAP, just before harvest, plant vigor, height, degree of tiller formation, and lodging 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 total weight and number 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, average ear diameter, length after husking, and shank length. One person rated the flavor of each entry. Rating scales are described below and in footnotes to tables. 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.

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. Climate information obtained from the Indiana State Climate Office at Purdue University documented that the last half of May was particularly cool, with an average air temperature of 56°F, 6°F below normal. Soil temperature at 4 inches measured within a quarter-mile of the trial averaged 62°F the first week after planting. From May 23 to August 15, 1590 growing degree days (GDD) accumulated, 94 fewer than normal. Aside from a 5-inch rainfall in early August, precipitation for the period totaled 6.2 inches, about half of normal. Irrigation prevented severe crop stress, but development was slower than normal, particularly early in the season.

Emergence 11 and 19 DAP averaged 82% and 88% of the intended seeding rate, respectively, with significant differences among varieties (Table 1). It is not clear that differences in emergence are related to genetics of the varieties because seed treatments varied among entries. For Mirai 130Y and 277A, low emergence led to final stands of 66% and 79% of the desired population, respectively; other varieties were within 89% of the desired stand after thinning (Table 1). Early vigor was high for the four earliest varieties: Sweet Surprise, 274A, Fantastic, and Awesome, and not far behind for 77747B. Varieties that ranked low for early vigor included Mirai 130Y, Mirai 350BC, 277A, and Holiday. Onion-leaving and leaning observed during early growth were consistent with injury from an acetanilide herbicides, such as s-metolachlor, but the cause of the symptoms was not definitively determined. BSS 0982 and Holiday consistently showed onion-leaving on more than a quarter of the plants, and those two plus Optimum showed leaning on more than 15% of plants. By the late whorl stage, plants had grown out of this injury. By harvest, varieties did not show dramatic differences in plant vigor. Most varieties produced short tillers on many plants; Holiday tended to produce fewer than other varieties, and Mirai 336BC, BSS 0982, and 77747B tended to produce some tillers long enough to interfere with harvest. Lodging after the August 4 rainstorm was consistently low for Garrison, and 277A had the worst lodging in the trial.

Results for yield and ear quality are presented in Table 2. Marketable yield averaged 7.2 tons per acre. 274A produced the highest yield of 8.5 tons per acre, but did not differ significantly from Sweet Surprise, Mirai 336BC, Obsession, Awesome, Fantastic, or 77747B. 277A and Mirai 130A yielded less than any other varieties, producing 5.2 and 5.1 tons per acre, respectively. Those two varieties also produced significantly fewer ears per acre (1178 and 1048 dozen, respectively) than other varieties. The remaining varieties averaged 1524 dozen ears per acre, ranging from 1419 for Mirai 308BC, to 1597 for Mirai 336BC and Obsession, and did not differ significantly from one another. Average weight per ear ranged from 0.74 pound (Mirai 350BC and 277A) to 0.91 pound (274A). Sweet Surprise, Awesome, Mirai 336BC, 77747B, and Obsession did not differ significantly from 274A. The remaining varieties did not differ significantly from Mirai 350BC.

Ear length ranged from 7.3 to 8.4 inches, and diameter ranged from 1.83 to 2.01 inches. The longest ears were produced by 274A, Holiday, and Mirai 336BC. Optimum produced the shortest ears, but not significantly different from six other varieties with ears up to 7.5 inches long. 274A produced the widest ears and Garrison the narrowest, but differences were not significant. Shank length averaged 3.7 inches (Table 1). Mirai 308BC had the longest shanks (4.8 inches), but did not differ significantly from five others with shanks more than 4.1 inches. All but one of the remaining varieties had shanks between 2.9 and 3.7 inches and did not differ significantly from one another. Optimum had the shortest shanks at 2.7 inches, significantly shorter than eight varieties with shanks longer than 3.4 inches.

Husk cover ratings averaged 3.9. Varieties that consistently had more than 2 inches of husk cover on most ears included Optimum, Mirai 350BC, and Mirai 336BC. These also had husks that were reasonably tight around the ear. Varieties with husk cover between 1.25 and 2 inches on most ears included Sweet Surprise, 274A, Fantastic, Awesome, Mirai 308BC, Garrison, Mirai 130Y, and Holiday. Of these, husks were quite loose on Garrison and 274A. 277A, BSS 0982, 77747B, and Obsession had husks with 0.75 to 1.25 inches of cover beyond the ear tip. Tip fill was generally good to excellent: nine varieties received ratings between 4.5 and 5.0, and all but one of the others received ratings more than 4. 274A, which received a rating of 3.4, indicating most ears had unfilled kernels 0.5 to 1 inch from the tip. Sweet Surprise, Awesome, and Mirai 336BC received high ratings for overall ear appearance, 7.7, 8.0, and 7.7 respectively. All others received at least a 5, indicating acceptable appearance.

Ear height, measured from the ground to mid-ear, ranged from 22 inches for 274A, to 30 inches for Obsession, and was positively correlated with harvest date. Other varieties with ears at least 25 inches above the ground included BSS 0982, Sweet Surprise, 277A, Mirai 336BC, Fantastic, Mirai 350BC, Mirai 130Y, 77747B, Garrison, and Holiday.

Two varieties consistently received “excellent” flavor ratings and “not tough to somewhat tough” pericarp ratings: 277A and Fantastic. Varieties with flavor ratings of “very good” to “excellent” or better included Sweet Surprise, Optimum, Holiday, Mirai 130Y, Mirai 308BC, Mirai 350BC, and Awesome. Pericarp was rated as no more than “somewhat tough” for all these varieties except Optimum, Mirai 130Y, and Mirai 308BC, all of which received one rating of “tough.” Varieties rated very “good” or “very good to good” for flavor, with at least one rating of “tough” for the pericarp included BSS 0982 and 274A, 77747B, and Obsession. Garrison received a rating of “fair” for flavor and “very tough” for pericarp.

Often, producers select one or two varieties in each maturity range, so it is helpful to compare varieties of similar maturity. Of the varieties harvested 77 days after planting, Awesome and Sweet Surprise were notable for high overall ear quality, generally better than Fantastic, which is considered a standard. 274A produced the largest ears of these four, but ears generally did not receive high ratings for quality. Of the three varieties harvested 78 to 80 DAP, Mirai 308BC produced the largest ears with the longest shanks, with a tendency to Fasciation; Optimum generally had the best ear quality and the shortest shanks; and 277A had the least vigorous plants and low yields due to low emergence. Five bicolor varieties were harvested 81-82 DAP. Of these, Mirai 336BC had the longest and best quality ears, with good early vigor. BSS 0982, 77747B, and Obsession had ears similar in length; BSS 0982 had longer and wider flag leaves than the other two; and husk cover on Obsession was not as good as on the other two. Mirai 350BC was noteworthy for small ears of good quality, and relatively low early vigor. Two yellow varieties were harvested 81 DAP. Garrison had better early vigor and smaller ears, while

Mirai 130Y had large ears and better eating quality, but low emergence and early vigor. Just one variety was harvested 84 DAP: Holiday produced large ears of good quality, but early vigor was relatively low.

Many varieties in this trial performed well. 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, lodging, and ear shank length for 15 supersweet (sh2) sweet corn varieties in Northern Indiana, 2008.

Cultivar	Emergence ^z %		Final Stand plants/ A	Plant Vigor ^y		Onion- Leafing <i>plants/row</i>	Leaning		Tillers ^x	Height Class ^v	Shank Length ^v <i>inches</i>	Lodging ^u					
	June 3	June 11		June 9	Harvest												
Sweet Surprise	93	97	20,328	8.7	±0.33	4.7	±0.33	0.3	±0.33	2.7	±0.33	3.0	±0.00	2.0	4.6	5.3	±0.67
274 A	96	99	20,328	8.3	±0.33	4.0	±0.58	0.0	±0.00	3.0	±0.00	2.0	±0.58	1.3	4.1	5.3	±0.33
Fantastic	90	92	19,921	8.3	±0.33	5.3	±0.33	0.7	±0.67	2.7	±0.33	3.0	±0.00	2.3	3.3	4.3	1.20
Awesome	94	101	20,328	8.0	±0.00	5.0	±0.58	0.3	±0.33	2.0	±0.00	3.0	±0.00	1.7	4.7	5.7	±0.33
Mirai 308BC	77	78	18,179	6.3	±0.88	4.0	±0.00	1.3	±1.33	2.0	±0.00	3.0	±0.00	1.7	4.8	6.3	±0.33
277 A	60	69	16,088	4.3	±0.33	3.3	±0.67	4.3	±2.85	3.3	±0.33	3.3	±0.67	2.0	3.2	3.0	±0.58
Optimum	84	91	19,341	5.3	±0.33	4.0	±0.00	2.0	±2.00	5.7	±0.33	3.3	±0.33	2.7	2.7	5.3	±0.67
BSS 0982	77	90	19,921	6.7	±0.33	4.3	±0.33	10.0	±2.52	6.3	±0.67	3.7	±0.33	3.0	3.7	4.7	±0.88
Garrison	100	104	20,328	6.3	±0.67	4.7	±0.33	0.7	±0.33	2.0	±0.00	2.3	±0.33	2.3	4.1	7.0	±0.00
Mirai 130Y	53	58	13,358	3.7	±0.33	5.0	±0.00	1.3	±0.33	1.7	±0.33	2.0	±0.00	2.3	3.3	5.7	±0.88
Mirai 350BC	78	82	18,586	4.3	±0.33	5.0	±0.00	3.0	±0.00	1.3	±0.33	2.3	±0.33	2.3	2.9	5.3	±0.33
77747B	78	80	18,411	7.7	±0.33	5.0	±0.00	2.7	±0.67	1.3	±0.33	3.7	±0.33	2.3	3.1	6.0	±0.58
Mirai 336BC	88	90	20,328	7.3	±0.88	5.0	±0.00	1.3	±0.67	1.3	±0.33	4.0	±0.58	2.0	3.3	6.7	±0.88
Obsession	90	92	19,921	7.0	±0.58	5.3	±0.33	0.7	±0.67	2.0	±0.58	3.3	±0.33	3.0	3.5	5.3	±0.33
Holiday	73	91	20,154	4.7	±0.67	4.7	±0.33	23.0	±4.16	5.3	±0.33	1.7	±0.33	2.7	4.1	5.0	±0.00
<i>Grand Mean</i>	82	88	18,992	6.5		4.6		3.4	3.3	2.9	2.2	3.7	5.4				
<i>LSD .05¹</i>	14	13															

^zPercentage of intended seeding rate.

^y1=very weak. 5=average. 9=very vigorous.

^x1=no or very few tillers. 3=tillers common but not tall enough to interfere with harvest. 5=tillers tall enough to interfere with harvest in most plants.

^v1=less than 5 feet. 2=5-6 feet. 3=more than 6 feet.

^vMeasured from attachment to stalk to base of ear; average of three ears per replication.

^u9=no lodging. 1=all plants severely lodged. Evaluated after 5. 2 inches of rain on August 4. Mean ± standard error.

Table 2. Yield, ear size, ear height, and quality of supersweet sweet corn in Northern Indiana, 2008.

Cultivar	Seed Source ^z	Color	Days to Harvest ^y		GDD to Harvest ^x	Yield of Marketable Ears		Avg. Ear Weight <i>lb</i>	Ear Length <i>in</i>	Ear Dia. <i>in</i>	Ear Ht. <i>in</i>	Husk Cover ^w	Husk Tightness ^w	Tip Fill ^w	Over-all ^w	Flavor	Pericarp
			Pred.	Actual		<i>doz/A</i>	<i>ton/A</i>										
Sweet Surprise	RI	BI	75	77	1371	1581	8.4	0.89	7.6	1.96	25.3	3.9	2.3	5.0	7.7	E-VG	N-S
274 A	ST	BI	74	77	1371	1549	8.5	0.91	8.4	2.01	21.8	3.9	1.4	3.4	5.0	VG	N-T
Fantastic	ST	BI	75	77	1371	1549	7.6	0.82	7.4	2.00	26.8	3.9	1.6	4.9	6.3	E	N-S
Awesome	ST	BI	74	77	1371	1533	8.0	0.87	7.4	1.97	23.8	4.4	2.7	5.0	8.0	E-VG	S-N
Mirai 308BC	CE	BI	71	78	1397	1420	6.5	0.77	7.5	1.96	24.9	3.9	1.6	4.7	5.7	VG-E	S-T
277 A	ST	BI	77	79	1421	1178	5.2	0.74	7.3	1.93	25.7	3.1	1.8	4.8	6.0	E	S
Optimum	CR	BI	78	80	1435	1484	6.7	0.75	7.3	1.90	23.7	5.0	2.0	4.3	6.0	E-VG	S-T
BSS 0982	SY	BI	80	81	1459	1484	6.9	0.78	7.8	1.90	25.1	3.2	2.1	4.1	6.3	VG	T-S
Garrison	SY	Y	79	81	1459	1549	7.0	0.76	7.5	1.83	28.2	3.9	1.4	4.8	6.7	F	VT
Mirai 130Y	CE	Y	71	81	1459	1049	5.1	0.82	8.1	1.99	26.9	4.0	1.7	4.2	6.0	VG-E	S-T
Mirai 350BC	CE	BI	78	81	1459	1452	6.5	0.74	7.5	1.90	26.8	4.7	2.2	4.1	6.3	VG-E	N-S
77747B	CE	BI	76	81	1459	1500	7.6	0.84	7.8	1.94	27.4	3.3	2.0	4.1	5.3	VG-G	S-T
Mirai 336BC	CE	BI	73	81	1459	1597	8.2	0.86	8.2	1.86	26.6	5.0	1.9	4.6	7.7	E-G	S
Obsession	ST	BI	79	82	1485	1597	8.0	0.84	7.9	1.92	29.7	2.6	1.7	4.9	5.7	VG-G	N-T
Holiday	CR	BI	84	84	1529	1517	7.2	0.79	8.2	1.92	28.9	3.5	1.8	4.7	6.0	VG-E	S
<i>Grand Mean</i>						<i>1469</i>	<i>7.2</i>	<i>0.81</i>	<i>7.7</i>	<i>1.93</i>	<i>26.4</i>	<i>3.9</i>	<i>1.9</i>	<i>4.5</i>	<i>6.3</i>		
<i>LSD .05ⁱ</i>						<i>217</i>	<i>1.2</i>	<i>0.08</i>	<i>0.3</i>	<i>ns</i>	<i>3.2</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>	<i>-</i>
<i>r^{2s}</i>						<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>0.39</i>	<i>0.50</i>						

^zSeed Source: CE= Centest, CR=Crookham, RI=Rispens, ST=Stokes, SY=Syngenta.

^yDays from planting to harvest. Predicted number is from seed supplier.

^xGDD: corn growing degree days.

^wHusk cover, tip fill: 1=worst. 5=best. Husk tightness: 1=loose. 3=very tight. Overall: 1=worst. 9=best.

^vFlavor: F=fair. G=good. VG=very good. E=excellent.

^uPericarp toughness: N=not tough. S=somewhat tough. T=tough. VT=very tough.

^tMeans differing by more than this amount are significantly different at $P \leq .05$ based on Fisher's Protected LSD. AOV not performed. s^2 for regression versus actual days to harvest is the proportion of variability explained by days to harvest. ns=regression not significant at $P < .05$.