

Supersweet Sweet Corn Cultivar Evaluation for Northern Indiana — 2011

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Indiana growers harvested sweet corn for fresh market sales from 6,500 acres in 2010, with an average yield of 92 cwt/acre (219 crates or 4.6 tons per acre) and total value of \$14.4 million (USDA NASS, 2011). Indiana ranks 13th 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 bicolor, one yellow, and one white shrunken-2 (supersweet) sweet corn entries 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 2010 soil test showed 1.5% organic matter, pH 6.2, 27 ppm phosphorus (P), 86 ppm potassium (K), 180 ppm magnesium (Mg), and 650 ppm calcium (Ca). Potassium (150 lb. K₂O/A from 0-0-60) and lime (1 ton/A) were broadcast in fall 2010 and spring 2011, respectively.

The trial was set up as a randomized complete block design with three replications. Twenty sweet corn entries were assigned to individual plots one row (30 inches) wide by 30 feet long. Corn was seeded May 19, 2011, with a finger pick-up planter and later thinned to 35 plants per 30-foot row (20,328 plants per acre). Nitrogen (N) (at 20.3 lb./acre) and P (at 18.2 lb./acre P₂O₅) were applied at planting from 19-17-0 (10 gal. /acre), and an additional 70 lb./acre N from urea ammonium nitrate solution was injected at the whorl stage.

Tefluthrin (Force 3G[®]) was applied at planting to control corn rootworms. Weeds were controlled with atrazine (Atrazine 4L[®]) and s-metolachlor (Dual II Magnum[®]), one cultivation, and hand weeding. Irrigation was applied during the growing season as needed. Permethrin (Arctic 3.2EC[®], 4 fl. oz./acre) was applied four times from July 5 to July 26 to control caterpillars.

Emergence was evaluated 12 days after planting (DAP) before thinning, and early plant vigor was rated 26 DAP. Plant vigor, height, and degree of tiller formation were rated and the height from the soil to the middle of the ear was measured for three ears per plot 74 to 78 DAP. Each plot was harvested when corn reached marketable stage, 19 to 22 days after 50% silking. 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, average ear diameter and length after husking, and shank length. Three people rated the flavor and pericarp toughness of each cultivar based on one uncooked ear apiece from each plot. Rating scales are described in table footnotes.

Numerical data with equal variance across treatments were analyzed using ANOVA followed by mean separation using Fisher's protected least significant difference at $P \leq 0.05$. When variance

was 0 for one or two entries, analysis was performed without those entries to achieve equality of variance. Relationships between means of yield components, ear and plant characteristics, and average days to harvest were analyzed using linear regression.

Results and Discussion

The growing season was wet with an exceptionally warm period in mid-July. The USDA National Agricultural Statistics Service Indiana Crop & Weather Reports documented that from May 16 to August 7, rainfall totaled 15.03 inches, 4.18 inches more than normal. More than 3 inches of rain fell within 10 days after planting. Rainfall recorded at the Ag Center was 4.97, 3.54, 7.28, and 3.17 inches for May, June, July, and August, respectively. The growing degree days (GDD) accumulation from May 16 to Aug. 7 was 1,674, 78 more than normal. From July 18 to the end of the month there were six days with a maximum temperature above 90°F and six nights with a minimum temperature above 70°F.

By 12 DAP, emergence averaged 118% of the intended seeding rate (data not shown). After thinning, all plots were within 98% of the desired stand of 20,328 plants per acre. Differences in early plant vigor were observed (data not shown): Sweet Surprise was the most vigorous, significantly more so than 10 other varieties. Stellar, EX08745857-R, HMX 0361WS (white kernels), Obsession, Summer Sweet 7112 R, HMX 9352BS, and ACX SSW 7403 RY (yellow kernels) did not differ significantly in from Sweet Surprise for the early vigor rating. ACX 7902 was significantly less vigorous than 11 other varieties. Plant vigor at harvest was significantly better for BSS 8040 and Obsession than for nine other varieties (data not shown). Plant vigor at harvest for EX08767143, EX08745857-R, Summer Sweet 7932 MR, 09B2840, HMX 9352BS, HMX 8343BS, and Sweet Surprise did not differ significantly from BSS 8040. Summer Sweet 2012 MR was significantly less vigorous than 12 other varieties. Early vigor was correlated with days from planting to harvest (data not shown): early-maturing varieties tended to receive better ratings for early plant vigor. Most varieties produced tillers with some large enough to interfere with harvest (data not shown).

Results for yield and ear quality are presented in Table 1. Per acre yields have been calculated by multiplying plot yields by the number of plots per acre and likely overestimate expected yield from field scale production. Marketable yield averaged 8.1 tons per acre. EX08767143 produced the highest yield, 9.6 tons per acre, but was not significantly higher than Stellar, Sweet Surprise, 09B2840, or Obsession. Summer Sweet 2012 MR produced the lowest yield of 6.8 tons per acre, but was not significantly lower than Summer Sweet 7002 R, Summer Sweet 7112 R, Summer Sweet 7602 MR, Gourmet Sweet Brand (GSB) 2873, or EX08745857-R. The number of marketable ears averaged 1,617 dozen per acre, but did not differ significantly among varieties. Varieties in the 75th percentile, producing more than 1,646 ears per acre, included EX08767143, 09B2840, Stellar, and Sweet Surprise.

Average weight per ear ranged from 0.70 lb. (Summer Sweet 2012 MR) to 0.93 lb. (Stellar). Six entries did not differ significantly from Stellar (Obsession, Sweet Surprise, EX08767143, BSS 8040, 09B2840, and ACX SSW 7403 RY) and two did not differ significantly from Summer Sweet 2012 MR (EX08745857-R and GSB 2873). Ear length ranged from 7.3 to 8.9 inches, and diameter ranged from 1.78 to 2.10 inches. The longest ears were produced by 09B2840, followed by Summer Sweet 7932 MR, EX08767143, Obsession, HMX 9352BS, BSS 8040, and ACX SSW 4002 MR. The shortest ears ranged from 7.3 to 7.5 inches and included EX08745857-R, HMX 0361WS, Summer Sweet 7112 R, Summer Sweet 7002 R, and Sweet Surprise. Stellar,

Sweet Surprise, and ACX 7902 produced the widest ears. HMX 0361WS, Summer Sweet 7112 R, and Summer Sweet 2012 MR produced the narrowest ears, less than 1.85 inches in diameter. Ear length was correlated with days to harvest: later maturing varieties tended to have longer ears.

Shank length ranged from 3.4 inches to 6.1 inches and averaged 4.6 inches. Varieties with the longest shanks were Stellar, HMX 8343BS, Summer Sweet 7932 MR, Summer Sweet 7112 R, and Sweet Surprise, all greater than 5.0 inches. Ear height, measured from the ground to mid-ear was greater than 29 inches for Summer Sweet 7602 MR, Summer Sweet 2012 MR, BSS 8040, ACX 7902, Summer Sweet 7002 R, 09B2840, ACX SSW 4002 MR, EX08767143, Obsession, and HMX 0361WS. Only GSB 2873, HMX 9352BS, and EX08745857-R produced ears less than 25 inches from the ground.

Husk cover ratings averaged 2.9. Summer Sweet 7112 R and ACX 7902, with ratings greater than 4, consistently had more than 1.25 inches of husk past the tip of the cob. HMX 8343BS, Stellar, Obsession, ACX SSW 4002 MR, EX08745857-R, and EX08767143, with ratings less than 2.5, had less than 0.75 inches of cover on most ears. The husks of EX08745857-R, Stellar, Summer Sweet 7712 MR, and 09B2840 were consistently loose around the ear tip. Tip fill ratings averaged 4.1 out of 5. Varieties with a rating greater than 4.5 for tip fill, indicating most ears were filled nearly to the tip, included ACX 7902, HMX 8343BS, Sweet Surprise, Obsession, ACX SSW 4002 MR, Summer Sweet 7932 MR, Summer Sweet 7112 R, and Summer Sweet 2012 MR.

For overall ear quality in terms of appearance, Sweet Surprise and Summer Sweet 7112 R received the highest ratings at 6.7. Other varieties greater than the 5.0 average included ACX 7902, ACX SSW 7403 RY, GSB 2873, Summer Sweet 7932 MR, Summer Sweet 7002 R, 09B2840, and HMX 9352BS. ACX 7902 received the best flavor rating (4.7 out of 5), followed by Summer Sweet 2012 MR, Summer Sweet 7712 MR, and Summer Sweet 7602 MR. These four varieties received similar ratings for pericarp toughness (1.8 to 2.2), with most ears rated as 'somewhat tough.'

Careful evaluation of results presented in Table 1 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. Yield, ear size, and quality of 18 bi-color, one yellow, and one white supersweet sweet corn varieties in northern Indiana, 2011. Varieties listed in order of harvest.

Cultivar	Seed Source ¹	Days to Harvest ²		Yield of Marketable Ears		Avg. Ear Weight lb	Ear Length in	Ear Dia. in	Shank Length in	Ear Ht. in	Husk Cover ³	Husk Tightness ³	Tip Fill ³	Overall ³	Flavor ⁴	Pericarp Toughness ⁴
		Pred.	Actual	doz/A	ton/A											
Sweet Surprise	RI	75	76	1,678	9.3	0.92	7.3	2.04	5.3	26.4	3.2±0.3	1.4±0.3	4.9±0.1	6.7±0.3	3.6	2.0
Stellar	ST	77	76	1,678	9.4	0.93	7.7	2.10	6.1	26.0	2.3±0.2	1.0±0.0	4.0±0.3	4.7±0.7	3.7	1.8
Summer Sweet 7112 R	AC	74	76-78	1,597	7.3	0.76	7.5	1.81	5.4	28.4	4.8±0.1	2.2±0.1	4.7±0.0	6.7±0.3	3.6	2.2
HMX 0361WS (white)	HM	70	76-78	1,646	8.0	0.81	7.5	1.85	4.5	29.1	3.1±0.1	1.4±0.2	3.1±0.4	4.7±0.3	3.2	3.0
EX08745857-R	SE	86	76-78	1,549	6.8	0.73	7.5	1.96	4.3	20.6	1.7±0.4	1.0±0.0	4.1±0.2	2.3±0.3	2.7	2.7
GSB 2873	ST	75	76-78	1,597	7.0	0.73	7.8	1.94	3.4	24.7	3.2±0.2	1.6±0.3	3.2±0.3	6.0±1.0	3.3	2.8
Summer Sweet 7002 R	AC	72	76-78	1,613	7.4	0.76	7.4	1.97	4.5	30.8	2.8±0.3	1.3±0.2	4.4±0.6	5.3±0.7	2.7	2.3
Summer Sweet 7712 MR	AC	78	76-78	1,613	8.4	0.87	7.9	2.00	4.1	26.2	2.7±0.4	1.1±0.1	3.4±0.7	4.7±0.7	4.0	2.2
Summer Sweet 2012 MR	AC	74	78	1,613	6.8	0.70	7.8	1.78	4.6	32.3	3.2±0.2	2.0±0.6	4.6±0.3	4.7±0.7	4.1	1.7
ACX SSW 4002 MR	AC	77	78	1,613	7.8	0.81	8.1	1.90	4.4	30.4	1.8±0.5	1.2±0.2	4.7±0.3	3.0±0.6	2.7	1.4
ACX SSW 7403 RY (yel.)	AC	74	78	1,549	8.2	0.89	7.9	1.88	4.1	28.0	3.2±0.4	2.0±0.2	4.2±0.4	6.0±0.6	3.7	2.1
HMX 8343BS	HM	75	78	1,517	7.5	0.82	7.9	1.88	5.6	27.9	2.3±0.3	1.2±0.2	4.9±0.1	4.7±0.3	3.1	2.3
09B2840	RU	76	76-81	1,726	9.2	0.89	8.9	1.92	4.4	30.7	3.3±0.2	1.1±0.1	3.9±0.1	5.3±0.3	2.8	2.2
HMX 9352BS	HM	75	76-81	1,597	7.9	0.82	8.3	1.97	3.8	22.9	2.6±0.1	1.3±0.0	3.4±0.6	5.3±0.9	2.9	1.0
Summer Sweet 7932 MR	AC	80	78-81	1,549	7.9	0.85	8.4	1.87	5.5	27.9	3.4±0.1	2.0±0.3	4.7±0.2	5.3±0.9	2.1	2.6
BSS 8040	SY	79	78-81	1,629	8.7	0.90	8.2	1.96	4.8	31.3	2.9±0.3	1.4±0.4	3.0±0.0	4.7±0.7	3.3	2.9
Summer Sweet 7602 MR	AC	76	78-81	1,533	7.2	0.79	8.0	1.89	4.4	32.9	3.9±0.1	1.3±0.2	3.7±0.6	4.7±0.3	3.8	1.9
Obsession	SE	79	78-81	1,629	9.0	0.92	8.3	1.93	4.6	30.1	1.9±0.2	1.7±0.0	4.8±0.1	5.0±1.0	3.6	2.2
ACX 7902	AC	77	81	1,646	8.2	0.83	7.9	2.01	4.4	31.0	4.2±0.1	2.1±0.1	5.0±0.0	6.0±0.6	4.7	1.8
EX08767143	SE	80	81	1,775	9.6	0.90	8.4	1.94	4.1	30.1	1.7±0.2	1.4±0.3	4.1±0.1	4.0±0.6	3.2	2.3
<i>Grand Mean</i>				<i>1,617</i>	<i>8.1</i>	<i>0.83</i>	<i>7.9</i>	<i>1.93</i>	<i>4.6</i>	<i>28.4</i>	<i>3.0</i>	<i>1.5</i>	<i>4.1</i>	<i>5.0</i>	<i>3.3</i>	<i>2.2</i>
<i>LSD .05⁵</i>				<i>ns</i>	<i>0.68</i>	<i>0.06</i>	<i>0.35</i>	<i>0.09</i>	<i>1.2</i>	<i>4.2</i>	<i>0.7</i>	–	–	–	<i>0.9</i>	<i>0.9</i>
<i>r²⁶</i>				<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>0.42</i>	<i>ns</i>	<i>ns</i>	<i>0.24</i>	–	–	–	–	–	–

¹Seed Source: AC=Abbott & Cobb; HM=Harris; RI=Rispens; RU=Rupp; SE=Seminis; SY=Syngenta; ST=Stokes.

²Days from planting to harvest. Predicted number is from seed supplier. Actual values are range for 3 replications.

³Husk 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: 1=loose; 3=very tight; 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. Overall: 1=worst; 9=best. Mean ± standard error.

⁴Flavor and Pericarp Toughness: Raw ears evaluated by three people. 1=poor; 2=medium; 3=good; 4=very good; 5=excellent flavor. 1=not tough; 2=somewhat tough; 3=tough; 4=very tough pericarp.

⁵Means differing by more than this amount are significantly different at $P \leq .05$ based on Fisher's Protected LSD. For diameter, LSD does not apply to Summer Sweet 7712 MR; for pericarp toughness, LSD does not apply to HMX 9352BS. ns=variety effect not significant. – AOV not performed.

⁶ r^2 for regression vs. actual days to harvest is the proportion of variability explained by days to harvest. ns=regression not significant at $P \leq .05$.