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Supersweet Sweet Corn Cultivar Evaluation for Northern Indiana — 2012

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Indiana growers harvested sweet corn for fresh market sales from 5,800 acres in 2011, with an average yield of 67 cwt/acre (159 crates or 3.3 tons per acre) and a total value of \$17.9 million (USDA NASS, 2012). Indiana ranked 15th among states for production of fresh market sweet corn and produced about 1.3% of the nation's total in 2011. 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 17 bicolor, two yellow, and two white supersweet (sh2) 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 2011 soil test showed 1.7% organic matter, pH 6.3, and 184 ppm phosphorus (P), 101 ppm potassium (K), 140 ppm magnesium (Mg), and 600 ppm calcium (Ca). Potassium (50 lb./A K₂O from 0-0-60) and nitrogen (30 lb./A N from 46-0-0) were broadcast May 8, 2012. An additional 70 lb./acre N from urea ammonium nitrate solution were injected at the whorl stage.

The trial was set up as a randomized complete block design with three replications. Sweet corn entries — 17 bicolor, two yellow (1673 and GSS 340437), and two white (XTH 3274 and Biscayne) — were assigned to individual plots one row wide (30 inches) by 30 feet long. The variety Obsession was included twice in each replication. Corn was seeded May 21 with a finger pick-up planter set to drop seeds 10.125 inches apart (20,600 plants per acre) and later thinned to 35 plants per 30-foot row (20,328 plants per acre).

Weeds were controlled with atrazine (Atrazine 4L[®]) and s-metolachlor (Dual II Magnum[®]) applied preplant incorporated and with hand weeding. Irrigation was applied regularly through drip lines adjacent to each row. Permethrin (Arctic 3.2EC[®], 4 fl. oz./acre) was applied three times between July 6 and 20 to control caterpillars.

Emergence was evaluated 10 and 14 days after planting (DAP), and final stand was determined 21 DAP after thinning. Early plant vigor was evaluated 19 DAP. Just before harvest, 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. Each plot was harvested when corn reached marketable stage, approximately 19 to 22 days after 50% silking. The weight and number of marketable first ears for each plot were recorded. Ears that touched the soil due to lodging of plants were not considered marketable. Three ears from each plot were selected to evaluate degree of husk cover, husk tightness, degree of tip fill, flag leaf length, overall attractiveness, average ear diameter and length after husking, and shank length. Overall ear quality was also rated. Three people rated the flavor and pericarp toughness of most entries based on one uncooked ear apiece from each plot. Rating scales are described in table footnotes. Letter ratings for flavor were converted to numerical ratings for statistical analysis.

Quantitative data with equal variance across treatments ($P > .05$) were analyzed using ANOVA followed by mean separation using Fisher's protected least significant difference at $P \leq 0.05$. When variance of a response was zero for a single entry, that entry was omitted from the ANOVA for that response.

Results and Discussion

The growing season was hot and dry. The USDA National Agricultural Statistics Service Indiana Crop and Weather Reports documented that from May 14 to July 30, rainfall totaled 9.29 inches, with almost half of that (4.43 inches) falling after July 15. The growing degree day (GDD) accumulation from May 14 to July 30 was 1,775, 343 more than normal. Irrigation did not completely eliminate plant water stress.

By 14 DAP, emergence averaged 91% of the intended seeding rate with no significant differences among entries (data not shown). Final stand after thinning averaged 91% (range 82 to 100%) of the desired stand of 20,328 but did not differ significantly among entries (data not shown). Early plant vigor ratings ranged from 3.0 to 6.7 on a scale of 1-9 (1=extremely low vigor, 9=extremely high vigor) (data not shown). Sweet Surprise, 1673, Stellar, and XTH 2576 were in the top 25% and 7602MR, 7112R, 7143, Biscayne, and BSS 5426 were in the bottom 25% for early vigor. Plant vigor ratings near harvest (data not shown) ranged from 3.3 to 8.0 on the 1 to 9 scale. Entries in the top 25% (>6.3) for vigor near harvest included Obsession, 7602MR, and XTH 2773. Varieties with vigor near harvest in the lowest 25% (<4.8) included Sweet Success, BSS 5426, CSABF9-357, 7002R, and CSABF10-423. Most varieties produced tillers; 7112R usually produced some large enough to interfere with harvest, and Fantastic, CSABF10-423, and BSS 5426 produced short or no tillers (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 6.8 tons per acre, and ranged from 4.9 to 8.4 tons per acre. Obsession produced the top yield in tons per acre, but not significantly greater than XTH 2576, 7143, Stellar, or Sweet Success. CSABF10-423 produced the lowest yield; 7002R, CSABF9-357, and Biscayne did not produce significantly greater yield than CSABF10-423. The number of marketable ears ranged from 1,000 to 1,629 dozen per acre, and averaged 1,390. Obsession produced the most ears per acre, but not significantly more than 10 other entries. CSABF10-423 produced the fewest marketable ears, but not significantly less than Biscayne and CSABF9-357.

Average weight per ear (including the shank) ranged from 0.67 lb. (7002R) to 0.89 lb. (7143). Ten entries had an average ear weight equal to or greater than 0.81 lb. and did not differ significantly from 7143: Sweet Surprise, XTH 2576, Obsession, 7602MR, BSS 5426, Stellar, XTH 3274, XTH 2302, 1673, and CSABF10-423. The lightest ears included 7002R, 7112R, and XTH 2773.

Marketable ear length ranged from 7.3 to 8.8 inches, and ear diameter ranged from 1.79 to 2.03 inches. Obsession produced ears significantly longer than all other varieties. 7143, Biscayne, CSABF10-423, Marquette, BSS 5426, Stellar, XTH 2302, 7602MR, 1673, and Fantastic produced ears between 7.9 and 8.3 inches long, and did not differ significantly from one another. The shortest ears were produced by Awesome. Ears of Sweet Surprise, XTH 2576, 7112R, GSS 340437, and 7002R averaged less than 7.6 inches, not significantly different than Awesome.

XTH 2302, 1673, and Sweet Surprise produced the widest ears, followed by Sweet Success, XTH 3274, Fantastic, and 7602MR, which were not significantly narrower. GSS 340437 produced the narrowest ears, but eight other varieties were not significantly wider.

Shank length ranged from 3.5 inches to 6.7 inches and averaged 4.9 inches. Sweet Surprise had shanks more than 6.5 inches long, but not significantly longer than shanks of Stellar, 7112R, BSS 5426, or 7602MR. Varieties with shanks between 3.4 and 4.5 inches included XTH 3274, 1673, CSABF9-357, Marquette, 7143, 7002R, Sweet Success, and XTH 2773; these did not differ significantly.

Ear height from the soil to mid-ear ranged from 22.8 to 30.1 inches and averaged 24.8 inches. GSS 340437 produced ears higher on the plant than any other entry in the trial, followed by 7002R and Obsession, which did not differ from one another.

Husk cover ratings averaged 3.1 (on a 1 to 5 scale, with 5 best). 7112R and Awesome were rated above 4.0, indicating they had at least 1.25 inches of husk covering the ear tip. 7602MR, XTH 2302, GSS 340437, and Sweet Surprise had ratings for husk cover between 3.8 and 4.0, and did not differ significantly from 7112R. The remainder of the entries had ratings between 2.2 and 3.2, and did not differ significantly from one another. The husks of Stellar, XTH 2576, XTH 3274, Fantastic, 1673, BSS 5426, and Sweet Success were consistently loose around the ear tip.

Tip fill ratings averaged 4.8 out of 5. Nine varieties received a rating of 5.0 for tip fill, indicating ears were filled to the tip: XTH 2302, Awesome, Obsession, Sweet Surprise, 7002R, XTH 2576 XTH 3274, 1673, and BSS 5426.

For overall ear quality, GSS 340437, 7112R, 7602MR, and XTH 2773 received ratings in the top 25% for the trial (higher than 6 out of 9). Other varieties rated greater than the 5.3 trial average included XTH 2302, Awesome, Sweet Surprise, XTH 2576, BSS 5426, and Marquette. Entries in the bottom 25% for overall ear quality included 7143, Obsession, CSABF10-423, and Biscayne.

Flavor ratings from two evaluators who rated all entries did not differ significantly among entries (data not shown). Pericarp toughness ratings from the same two evaluators showed significant differences among varieties (data not shown). GSS 340437 was rated as significantly tougher than all other entries except BSS 5426. 7002R and 7602MR were rated as significantly less tough than those two entries, CSABF10-423, Sweet Success, and Obsession.

The hot and dry weather this season stressed sweet corn in this trial. Nonetheless many varieties produced acceptable yields and quality. 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 supersweet (sh2) sweet corn varieties in northern Indiana, 2012. Varieties listed in order of harvest.

Cultivar	Seed Source ¹	Days to Harvest ²		Yield of Marketable Ears		Avg. Ear Weight <i>lb</i>	Ear Length <i>in</i>	Ear Dia. <i>in</i>	Shank Length <i>in</i>	Ear Ht. <i>in</i>	Husk Cover ³	Husk Tightness ³	Tip Fill ³	Overall ³	
		Pred.	Actual	<i>doz/A</i>	<i>ton/A</i>										
Sweet Success	RI	76	72	1,533	ABC	7.4	0.81	7.78	2.00	4.0	24.1	2.6	1.0±0.0	4.9±0.1	4.7±0.7
XTH 2773	IF	73	72-74	1,387	BCDE	6.0	0.73	7.67	1.85	3.5	23.3	3.2	1.8±0.1	4.6±0.2	6.3±0.3
Fantastic	ST	75	72-74	1,533	ABC	7.1	0.78	7.93	1.97	4.6	23.9	2.8	1.1±0.1	4.9±0.1	5.3±0.9
Sweet Surprise	RI	75	72-74	1,371	BCDE	7.1	0.87	7.56	2.03	6.7	22.8	3.9	2.0±0.5	5.0±0.0	6.0±1.0
Awesome	ST	76	72-74	1,404	ABCDE	6.8	0.80	7.28	1.93	5.1	24.2	4.3	2.2±0.1	5.0±0.0	6.0±1.0
Marquette	HM	76	72-74	1,420	ABCDE	6.4	0.75	8.13	1.89	4.3	23.0	2.9	1.9±0.1	4.2±0.4	5.7±0.7
Stellar	ST	77	72-74	1,484	ABCD	7.5	0.84	8.07	1.93	6.1	24.1	2.7 ⁵	1.3±0.2	4.9±0.1	5.0±1.0
XTH 2302	IF	73	74	1,242	EF	6.2	0.83	7.99	2.03	5.3	24.7	4.0	2.3±0.3	5.0±0.0	6.0±1.2
7002R	AC	74	74	1,484	ABCD	6.0	0.67	7.35	1.85	4.1	27.6	2.2	2.0±0.0	5.0±0.0	5.3±0.9
XTH 3274 (white)	IF	74	74	1,339	CDE	6.7	0.84	7.64	2.00	4.5	24.1	2.8	1.1±0.1	5.0±0.0	5.3±0.9
1673 (yellow)	ST	75	74	1,339	CDE	6.5	0.82	7.96	2.03	4.4	25.3	2.6	1.1±0.1	5.0±0.0	4.7±0.3
XTH 2576 (Stellar)	IF	76	74	1,549	ABC	8.1	0.87	7.56	1.93	5.3	23.6	2.3	1.2±0.2	5.0±0.0	6.0±1.2
CSABF9-357	CR	78	74	1,210	EFG	5.8	0.80	7.83	1.86	4.4	23.6	3.0	2.0±0.0	4.7±0.2	4.3±0.3
CSABF10-423	CR	75	74-77	1,000	G	4.9	0.81	8.14	1.88 ⁵	4.6	24.8	2.8	1.4±0.3	4.7±0.3	3.7±0.3
7112R	AC	77	74-77	1,517	ABCD	6.6	0.73	7.54	1.83	5.8	24.7	4.4	2.0±0.0	4.8±0.2	7.0±0.0
Biscayne (white)	HM	77	77	1,033	FG	4.9	0.80	8.17	1.90	4.6	25.0	2.8	2.7±0.3	4.3±0.2	3.7±0.3
7602MR	AC	79	77	1,291	DE	6.7	0.87	7.97	1.94	5.7	24.2	4.0	1.7±0.3	4.7±0.2	6.3±0.7
7143	SE	81	77	1,500	ABCD	8.0	0.89	8.26	1.88	4.1	25.1	2.6	1.8±0.1	4.4±0.4	4.0±0.0
Obsession	SE	81	77	1,629	A	8.4	0.85	8.64	1.85	4.7	26.7	2.4	2.1±0.3	5.0±0.0	3.7±0.3
Obsession	SE	81	77	1,597	AB	8.4	0.87	8.75	1.90	5.1	26.3	2.2	1.9±0.1	4.9±0.1	4.3±0.3
GSS 340437 (yellow)	SY	79	77-79	1,404	ABCDE	6.6	0.79	7.50	1.79	5.5	30.1	3.9	2.0±0.0	4.4±0.3	7.3±0.3
BSS 5426	SY	81	77-79	1,307 ⁵		6.7	0.85	8.11	1.86	5.8	25.1	3.0	1.0±0.0	5.0±0.0	5.7±0.3
<i>Grand Mean</i>			75	1,390		6.8	0.81	7.90	1.91	4.9	24.8	3.1	1.7	4.8	5.3
<i>LSD .05⁴</i>			–	229		1.1	0.08	0.34	0.09	1.0	2.1	1.0	–	–	–

¹Seed Source: AC=Abbott & Cobb; CR=Crookham; HM=Harris Moran; IF=Illinois Foundation Seed; RI=Rispens; SE=Seminis; ST=Stokes; SY=Syngenta.

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 ± s.e.m. if LSD not presented.

⁴Means differing by more than this amount are significantly different at $P \leq .05$ based on Fisher's Protected LSD. Means followed by the same letter do not differ significantly. AOV not performed.

⁵This entry excluded from AOV for this response due to zero variance.