

Report to the Oregon Processed Vegetable Commission  
1986

1. Title: Supersweet (sh<sub>2</sub>) corn variety yield and processing trial
2. Project Leaders: J. R. Baggett, Horticulture  
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3. Project Status: Terminating, June 30, 1987
4. Project Funding by Commission for this Period: \$3,100  
\$1,600 allotted to the field phase was used for a research farm assessment and labor for plot maintenance and harvest. \$1,500 allotted to the processing phase was used primarily for labor in processing samples and also for analytical and sensory expense.
5. Objectives: To evaluate yield, uniformity, plant characteristics, and ear characteristics in the field, and processed quality of new varietal introductions of supersweet (sh<sub>2</sub>) corn.
6. Report of Progress:

The performance and quality of 25 supersweet corn varieties was observed in a replicated planting made on May 19. Each replication consisted of a 32 foot plot with about 30 feet of corn in rows 36" apart. Initially, 150 seeds/plot were planted and the seedlings were thinned to 35 normal plants. Because emergence problems, probably caused by cloddy soil, resulted in uneven spacing, a second trial was planted June 11. Because seeds of some varieties were depleted, the second planting included only 19 varieties.

The first planting included two additional dimensions: 1) 4 varieties were each entered in the trial with normally treated seed, and with coated (pelleted) seed and 2) extra row lengths of 4 varieties were planted to permit a sequence of harvests at 3 maturity stages for quality evaluation. Yield data were not obtained from these sequential harvests.

The attached tables present yield and quality data for 11 varieties, chosen because of good yields in one or both trials or because of known interest by processors. Germination and seedling vigor are given for all varieties grown (Table 2). Complete data, including ear measurements and panel quality scores for all varieties will be available separately at a later time.

A. Field Performance of Varieties

The effect of pelleting on % germination and seedling vigor was variable among varieties in the May 19 planting (Table 2), and differences were usually not large enough to form reliable conclusions. Pelleting appeared to be detrimental in 'Crisp 'n Sweet 710' and 'Summer Sweet 7200', beneficial in 'Crisp 'n Sweet 720', and neutral in 'Sucro'.

The ears were harvested as close as possible to a goal moisture content of 78%. Actual % of moisture varied from 77.1 to 80.3% in the early trial, and from 75.6 to 79% in the late trial.

Yields varied from 3.2 to 6.1 tons/acre of husked good ears in the early trial and from 5.8 to 7.4 tons/acre in the later trial. No direct comparison with 'Jubilee' was possible, but typical yield of husked good ears of 'Jubilee' on the vegetable research farm range from about 6 to 8 tons/acre. Many varieties that yielded well in the late trial were poor in the early trial (Table 1). It should be noted that in certain cases, such as 'Sweetie', 'Crisp 'n Sweet 710', and 'Crisp 'n Sweet 720', lower yields may be the result of harvest at higher % of moisture. Part of the yield reduction may be due to more immature ears which were classed as culls. Three varieties, 'Pinnacle', 'Crisp 'n Sweet 710', and 'FMX-85' yielded well in both trials. Two varieties, 'FMX-85' and '84-3376', were notable for tenderness as determined by a pressure tester. Tenderness of pericarp appears to be a great advantage because it should permit harvest at more mature stages (lower % of moisture) and result in higher yields with fewer immature culls. However, in supersweet corn there has been a general association between pericarp tenderness and germination problems. Note in Table 2 that 'FMX-85' and '84-3376' have fair to poor germination counts and low seedling vigor scores in the early trial where these factors were a problem.

The effect of quality in relation to maturity was addressed in this trial by making 3 sequential harvests of 'FMX-85', 'Crisp 'n Sweet 710', 'Illinigold', and 'Summer Sweet 7200'. Two harvests were also made of '84-3376'. Quality evaluations are summarized below. Although yield data were not obtained, in the lower % of moisture samples there was a pronounced improvement in tip fill and % of ears which would be considered usable in the processing plant.

#### B. Processed Quality Evaluation

Ears of 25 varieties were supplied from the early field planting for processing evaluation. The samples were made up of typical good ears, usually the first or main ears from the plants. The % moisture values reported in the field and processed quality data tables were obtained from these samples of ears.

Kernels mechanically cut from the ear were processed by air blast freezing at  $-35^{\circ}\text{F}$  in 10 oz. cartons, and by still retort canning in 303 x 406 containers (Process: 52 minutes at  $240^{\circ}\text{F}$ ).

A 12 member sensory panel of OSU staff and students evaluated the processed products for color, texture, flavor, appearance, and overall quality. In this report, quality data have been compiled for a selected group of 12 varieties after canning (Table 3) and after freezing (Table 4), with samples of normal sweet 'Jubilee' corn included for comparison.

The complete record of evaluation results for the 25 lines will be available after an Industry evaluation of the processed sample material has been made.

Canned Product: Samples representing 'FMX-85', 'Crisp 'n Sweet 700', and '84-3376' in the moisture range 77 to 79% received the highest

overall scores and also superior scores for all individual quality factors from the OSU panel. The overall quality of these 3 lines, plus 'Pinnacle' and 'Crisp 'n Sweet 720' were superior to 'Jubilee' in direct comparison.

Frozen Product: OSU panel data in Table 4 show the lines 'SCH 4035' and 'Crisp 'n Sweet 700' to be higher rated for most individual quality factors as well as overall quality in the moisture range 79.5 to 77%. Other superior lines in comparison with 'Jubilee' normal sweet were 'Pinnacle' and 'FMX-85'.

Harvest Maturity Versus Sensory Quality of Selected Hybrids: Since information on the interaction of harvest maturity, variety and processing quality of supersweet corn is not yet available, sensory quality data were developed for 5 varieties harvested at three maturity increments indicated by approximately 2% reductions in moisture between 81% and 77%. Harvest lots at each maturity increment were processed in whole kernel style by freezing and canning according to processes indicated earlier. Sensory quality evaluation data were obtained using a 12 member OSU panel of staff and students. Table 5 presents the panel results for the canned product only. A complete record of maturity vs canned and frozen whole kernel quality will be available after work in progress, including an Industry evaluation of the products, is completed.

Results: The following maturation effects on the sensory quality of the canned corn are indicated by the panel scores in Table 5:

- 1) Color improved substantially for all lines through the range of maturation shown. Color quality was unacceptable at raw kernel moistures above 80% and was highest in all lines at 77 to 76%.
- 2) Appearance of kernels improved substantially for all lines as moisture dropped below 80%. Appearance was acceptable below 80% in all lines, and change was nominal between 79% and 77%.
- 3) Texture quality response to maturation varied with corn variety. Texture improved in 1 of 3 lines where quality data for >80% and <80% moisture were available. Quality declined due to onset of kernel toughness in 2 of 5 lines between 79% and 77% moisture.
- 4) Flavor, like appearance, improved substantially in all lines as kernel moisture dropped below 80%. Between 79% and 77% moisture, quality showed no change in 4 lines, but improved in 1 line (Crisp 'n Sweet 710).
- 5) Overall quality was unacceptable at kernel moisture >80% in the 3 lines where data was available. Between 79% and 77-76%, scores were unchanged or improved in 1 line at lower moisture (Crisp 'n Sweet 710).

#### 7. Summary:

Germination of 25 supersweet corn varieties was variable and often poor in a May 19 planting. Pelleting of seed varied from detrimental to slightly

beneficial in 4 varieties for which this treatment was available. Yields of husked good ears were in the range of 3.2 to 6.1 tons/acre with most varieties under 5 tons for the early planting, but a number of varieties yielded in the 6-7 ton range in the second (June 11) planting indicating that yields comparable to those of 'Jubilee' are possible. Varieties showing the greatest promise for a combination of yield and processed quality were 'FMX-85', 'Crisp 'n Sweet 710', '84-3376', and 'Pinnacle'. Although low yielding in the early trial, 'Crisp 'n Sweet 700' and 'Crisp 'n Sweet 720' received good quality scores and should be tested further. Varieties with a more tender pericarp are of special interest because the greater tenderness may permit harvest at more mature stages and consequently higher yields. Sequence harvests of 4 varieties indicated color, flavor, and appearance improves as % moisture decreases from about 80% down to the 77-76% range, and that the texture of the more tender varieties will remain acceptable at 76% or lower. At these more mature stages, several of the varieties tested should be competitive with 'Jubilee' in yield.

8. Signatures:

Redacted for Privacy

Project Leaders

Redacted for Privacy

Redacted for Privacy

Department Heads

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JRB:vf

Table 1

Summary of field data for selected varieties,<sup>1</sup> 1986 Supersweet (sh 2) corn trial - Corvallis, Oregon, 1986

Variety	Source <sup>2</sup>	May 19 Planting						June 11 Planting						Overall Score, <sup>3</sup> (1-10)	Notes
		Days to Maturity	% Moisture	T/A Good Ears	T/A Culls	lbs/Ear	Tender-ness	Days to Maturity	% Moisture	T/A Good Ears	T/A Culls	lbs/Ear	Tender-ness		
Pinnacle	1	92	77.3	5.6	0.4	.57	153	87	78.4	7.3	0.5	.61	140	7	Long pointed; often poor tip fill; medium tough.
SCH 4035	3	92	78.3	4.1	1.3	.59	138	89	78.2	7.3	1.3	.62	138	5	Var. maturity; bad tips; spaces; medium tough.
CNS 720	4	93	79.3	3.4	1.1	.62	136	98	77.2	7.0	1.8	.59	120	5	Tapered, rough tips; var. mat., color, and shape.
84-3376	8	95	78.0	4.5	0.6	.55	107	92	79.0	7.4	1.1	.55	102	7	Jubilee type with lighter color; tender.
81-2947	8	91	78.5	4.9	1.2	.74	178	89	75.6	7.3	0.5	.80	182	6	Easy picks; immat. green tips; taper; tough.
FMK 85	2	100	78.6	6.1	0.3	.81	131	98	78.6	6.8	1.1	.77	117	8	Large, poor cover, some poor fill, green tips; tender.
CNS 700	4	93	77.1	3.2	0.8	.55	126	89	78.4	6.8	1.3	.56	122	6	Var. row st. & top fill; easy pick; med. tender.
Sweetie	6	94	80.3	3.5	1.4	.52	105	94	78.9	6.6	1.2	.56	—	6	Easy pick; thick husk; rows break; ear short; tender.
81-2949	8	92	77.7	4.3	0.6	.53	142	90	76.1	6.4	0.8	.73	158	6	Variable; many short; best look good; tough.
CNS 710	4	92	79.3	5.1	1.1	.63	180	89	78.8	6.0	0.9	.64	148	6	Picks, husks easily; kernels uneven; med. tough.
Illinigold	3	92	78.1	3.5	0.9	.50	115	90	76.4	5.8	0.9	.54	126	6	Immature tips & many small half-size ears; med. tender.

<sup>1</sup> Chosen on basis of yield for at least one trial, general characteristics, or known interest.<sup>2</sup> Sources: 1 = Harris-Moran, 2 = Ferry Morse, 3 = Illinois Foundation Seed, 4 = Crookham, 6 = Sun, 8 = Rogers Brothers.<sup>3</sup> Overall score relates to general characteristic of harvested ears.

Table 2. Stand counts and seedling vigor scores, supersweet (sh<sub>2</sub>) corn varieties, Corvallis, Oregon, 1986

Variety	May 19 Planting			June 11 Planting	
	Stand <sup>1</sup> Counts	Seedling <sup>2</sup> Vigor	Seedling <sup>3</sup> Height (cm)	Stand <sup>1</sup> Counts	Seedling <sup>2</sup> Vigor
Pinnacle	119	3.3		136	4.9
FMX 85	90	1.0		112	3.5
Illinigold	114	2.3		120	4.0
SCH 4035	82	2.0		115	5.0
SCH 4093	101	2.3		124	2.9
SCH 5076	109	2.3		130	5.0
Crisp 'n Sweet 700	113	2.7		136	4.1
Crisp 'n Sweet 710	105	3.0	24.7	124	5.0
Crisp 'n Sweet 710 (coated)	97	2.7	20.7	126	4.8
Crisp 'n Sweet 720	104	2.0	23.0	128	3.8
Crisp 'n Sweet 720 (coated)	120	3.3	21.8		
Summersweet 7200	103	2.0	23.2	125	4.9
Summersweet 7200 (coated)	95	2.0	22.7		
Summersweet 7700	123	2.7		132	3.9
Summersweet 7900	90	2.0		117	4.6
Sweetie	98	2.7		125	4.6
Sweet Belle	93	3.0			
XPH 2606	122	2.7			
XPH 2563	103	1.7			
XPH 2587	94	2.0			
XPH 2573	108	2.0		120	4.4
Sucro (coated)	112	1.7	26.8		
Sucro	115	2.0	25.3		
81-2945	100	3.0		121	5.0
84-3376	104	1.7		128	4.6
81-2947	107	4.0		130	5.0
81-2946	86	3.3			
81-2949	124	4.3		127	5.0
HMS 4372S	129	2.0		120	4.2

<sup>1</sup>Average of 4 replications; 150 seeds planted per replication.

<sup>2</sup>Average of 4 replications; 1-5 scale, 1 = poor, 5 = good.

<sup>3</sup>Average of 2 replications, about 70 observations per replication; measurements taken June 10.

Table 3: CANNED WHOLE KERNEL SUPERSWEET CORN: SENSORY QUALITY OF 12 SELECTED VARIETIES, 1986

Variety Designation	Source <sup>2</sup>	% Moisture	OSU Panel Mean Score <sup>1</sup>		Comments
			Overall Score	Higher scores for these attributes <sup>3</sup>	
Pinnacle	HM	77.5	5.9	color; appear.; text.	
FMX-85	FM	78.5	6.7	color; appear.; text.; flav.	
SCH 4035	IFS	78.5	5.4	texture	dull color; variable length kernel
Illinigold	IFS	78.0	4.9	--	pale dull color; musty flavor
Crisp-N-Sweet 700	CR	77.0	6.7	color; appear.; text.; flavor	
Crisp-N-Sweet 710	CR	79.5	4.7	texture	
Crisp-N-Sweet 720	CR	79.5	5.7	color; appear.; text.	
Summersweet 7200	AC	79.0	5.2	appear.	
Sweetie	SS	80.5	4.9	--	pale; immature flav.
84-3376	RB	78.0	6.2	color; appear.; text.; flav.	
81-2947	RB	78.5	4.6	--	2-tone color; tough; harsh flav.
81-2949	RB	77.5	3.9	--	pale, 2-tone color; tough; cobby flav.
Jubilee	RB	73.5	4.8	color	non-crisp text.; starchy flav.

- NOTES:
- <sup>1</sup>Panel of 12 judges using 9-point scale where 9 = outstanding, 5 = average acceptable, 1 = very poor.
- <sup>2</sup>Source: AC = Abbott and Cobb; CR = Crookham; FM = Ferry Morse; HM = Harris-Moran; IFS = Illinois Foundation Seed; RB = Rogers Brothers; SS = Sun Seeds.
- <sup>3</sup>Individual attributes scored: color, appearance (appear.), texture (text.), flavor (flav.). Higher scores are considered 5.6 or above.

Table 4: FROZEN WHOLE KERNEL SUPERSWEET CORN: SENSORY QUALITY OF 9 SELECTED VARIETIES, 1986

Variety Designation	Source <sup>2</sup>	% Moisture	OSU Panel Mean Score <sup>1</sup>		Comments
			Overall Score	Higher scores for these attributes <sup>3</sup>	
Pinnacle	HM	77.5	5.6	color; appear.	soft texture
FMX-85	FM	78.5	5.7	appear.; text.	top appear. score
SCH 4035	IFS	78.5	6.1	color; appear.; flav.	
Illinigold	IFS	78.0	4.8	--	pale; immature appear.;
Crisp-N-Sweet 700	CR	77.0	5.6	color; appear.; flavor	
Crisp-N-Sweet 720	CR	79.5	6.2	color; appear.; text.; flav.	
Sweetie	SS	80.5	5.3	flavor	pale; immature; sweet
81-2947	RB	78.5	5.1	color; appear.	coarse texture
81-2949	RB	77.5	5.4	appear.	tough skin
Jubilee	RB	73.5	4.7	color; appear.	soft text.; milky liquor; low-sweet flavor

NOTES:

<sup>1</sup>Panel of 12 judges using 9-point scale where 9 = outstanding, 5 = average acceptable, 1 = very poor.

<sup>2</sup>Source: CR = Crookham; FM = Ferry Morse; HM = Harris-Moran; IFS = Illinois Foundation Seed; RB = Rogers Brothers; SS = Sun Seeds.

<sup>3</sup>Individual attributes scored: color, appearance (appear.), texture (text.), flavor (flav.). Higher scores are considered 5.6 or above.



Table 5: CANNED SUPERSWEET CORN: EFFECT OF HARVEST MATURITY ON SENSORY QUALITY OF 5 SELECTED VARIETIES, 1986.

Variety	Harvest <sup>3</sup> Moisture %	OSU Panel Mean Scores <sup>1</sup>					Source <sup>2</sup>
		Overall	Color	Appearance	Texture	Flavor	
84-3376	78.0	6.2	5.9	5.8	6.4	6.2	RB
	76.0	6.5	6.3	5.7	6.6	6.7	
Crisp-N-Sweet 710	81.5	4.7	3.7	4.8	5.7	4.9	CR
	79.5	4.7	5.0	5.5	5.7	3.8	
	77.0	5.7	6.2	5.5	5.5	6.0	
FMX-85	81.0	4.4	4.5	4.4	5.5	3.9	FM
	78.5	6.4	6.2	6.2	6.9	6.3	
	77.5	6.7	6.7	6.7	6.5	6.3	
Illinigold	78.5	5.5	5.3	5.2	6.1	5.2	IFS
	77.5	5.7	6.2	5.8	5.6	5.6	
Summersweet 7200	82.0	4.5	3.9	5.0	5.4	4.5	AC
	79.0	5.2	5.3	5.7	5.5	5.2	
	77.0	5.5	6.1	5.5	5.4	5.3	

NOTES:

<sup>1</sup>Panel of 12 members. 9-point scale where 9 = outstanding and 1 = very poor.

<sup>2</sup>Source: AC = Abbott and Cobb; CR = Crookham; FM = Ferry Morse; IFS = Illinois Foundation Seed; RB = Rogers Brothers.

<sup>3</sup>Moisture of cut kernels by microwave method.

GWV/dme