COMMERCIAL SORTING OF SUPERSWEET CORN SEED FOR ASSURED YIELD

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Objective

The effects of seed class and seed density on supersweet corn plant stand, plant development, and yield were examined using a single lot of Crisp 'N Sweet 710. Seed class and seed density can be controlled in packaging supersweet corn seed and could provide a means to more reliable plant stand establishment.

Introduction

Emergence and performance of supersweet corn can be unpredictable. The roles of pathogens, genotypes, seed lots, fungicides, and bactericides in stand and vigor loss are being investigated. Within any commercial lot of supersweet corn seed, variation exists as to seed size, type, and weight. The seed industry and growers have a mutual interest in understanding what fractions of supersweet corn seed are of high quality and what fractions have marginal quality. Results of the 1990 trials showed the negative influence of low seed density and the extra large round class on plant stand and on yield and ear quality.

Materials and Methods

A supersweet corn trial was located on a Greenleaf silt loam soil following sugar beets. One hundred pounds of phosphate was broadcast and then the field was ripped and chisel plowed in November of 1990. The field was then corrugated into 30 inch rows. Roundup at 1qt. ai/acre and 2,4D at 1qt. ai/acre were applied preplant on April 22. The field was preirrigated on May 4, and treated with a preplant application Lasso at three pounds active ingredient per acre on May 14. The Lasso was incorporated with a bed harrow and roller. The trial was planted May 15. Weedar (2,4 D) was sprayed for weed control at 2 lbs ai/acre on June 19. The field was sidedressed with 150 pounds N per acre as urea June 28 and was cultivated on July 2. After planting, the trial received seven irrigations in alternating furrows starting on June 12.

A single lot of Crisp 'N Sweet 710 seed was divided by seed industry equipment into normal seed classes including the following:

1. Large flat
2. Extra large flat
3. Large round
4. Extra large round

and Other classes.

Each of the four seed classes based on seed size and shape was divided by seed density. First the seed was divided into thirds based on density using a gravity table to obtain low, medium, and high density seed. The high density seed was further divided into thirds to yield low, medium and high density fractions (Figure 1).

The four seed classes times seven seed density fractions (with five average densities) resulted in 28 seed fraction treatments. All seed were treated with Thiram plus Difolitan plus Apron. Seed was planted May 15 with treatments arranged in a randomized complete block design with five replicates. Each plot consisted of four rows of corn 25 feet long. Seedling emergence and plant stand counts were made June 4, 7, 11, 14 and 18. Average plant heights were measured July 19 and vigor was judged subjectively for each plot based on a scale of 0-10.

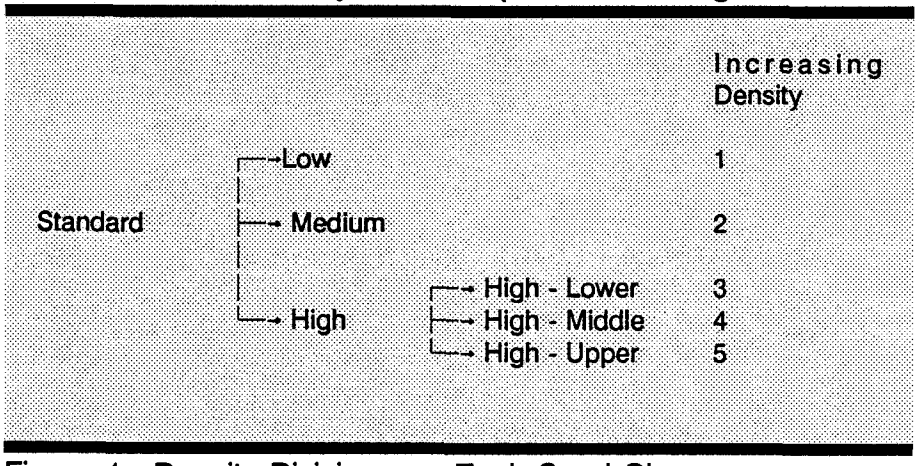

Figure 1. Density Divisions on Each Seed Class.

Plant stand was thinned as close as possible to 24,000 plants per acre on June 26. In thinning no preference was made as to plant size, health, or vigor. Plots were thinned and carried to harvest maturity to determine if there were seed class or density effects on yield, grade, or maturity independent of their effects on plant stand alone. Before harvest the interior seventeen feet from the middle two rows of each four row plot were flagged and the plants were counted. At harvest all potentially useable ears were harvested, counted, and weighed. Fifteen ears were shucked, weighed, and rated for maturity (scale 1-5) and percent culls. The seven seed density classes were evaluated based on their progressive ranking into five average density classes (Figure 1).

Results and Discussion

Cool soil temperatures delayed emergence, providing conditions favorable for seed pathogens and seedling blight. Average stand reached a maximum of 78.9 percent June 14 then declined to 77.8 percent by June 18. Flat seed resulted in significantly higher plant stands than round seed classes at all observation dates (Table 1). Plant stand was closely related to seed density (Table 2).

Seed class and density had no significant interactive effects on plant stand on any of the observation dates. For simplicity the complete data from only June 18 are presented (Table 3).

Corn was at 74% moisture August 16 and harvest occurred on August 21. Seed class had a significant effect on yield with the large flat seed yielding significantly more than the extra large round class (Table 4). Low seed density had a negative effect on plant population, despite the plots being thinned to a uniform stand (Table 5). Neither seed class nor seed density had any significant effect on the other performance parameters (Tables 4 and 5).

Conclusions

From the 1990 and 1991 results, supersweet corn plant stands are clearly influenced by seed class and seed density. In spite of thinning to uniform stand, the negative influences from certain fractions of low density seed and from the round classes can persist to harvest. Further studies can confirm these trends or determine if they are limited to this variety. Further understanding of seed lot fractions with poor performance can improve seed reliability and reduce risks to growers.

Acknowledgements

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Table 1. Seed class and plant stand over time of Crisp 'N Sweet 710 supersweet corn planted May 15. Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1991.

Treatments Seed Classifications	Dates of Plant Stand Counts				
	June 4	June 7	June 11	June 14	June 18
	---------- % ----------				
Large Flat	80.7	79.0	80.4	81.2	80.1
Extra Large Flat	80.9	80.6	81.4	80.2	79.9
Large Round	74.9	75.1	76.6	77.4	75.7
Extra Large Round	77.5	76.1	76.7	76.8	75.3
LSD (0.05)	3.2	2.9	2.4	2.7	2.7

Table 2. Seed density and plant stand over time of Crisp 'N Sweet 710 supersweet corn planted May 15. Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1991.

Treatments Seed densities	Dates of Plant Stand Counts				
	June 4	June 7	June 11	June 14	June 18
	---------- % ----------				
1. Low	73.3	71.0	73.4	71.8	71.8
2. Medium	79.5	79.4	79.3	80.3	79.6
3. High-Lower	78.3	77.5	78.1	78.8	76.5
4. High-Middle	80.7	79.7	80.4	80.7	80.4
5. High-Upper	80.8	81.1	82.7	82.7	80.6
LSD (0.05)	3.6	3.2	2.6	3.0	3.0

Table 3. Interactive effects of seed density and seed class on the stand of Crisp 'N Sweet 710 supersweet corn planted May 15. Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1991.

Percent Plant Stand June 18					
Seed density fraction	Seed Classification				
	Large Flat	Extra Large Flat	Large Round	Extra Large Round	Average
	- - - - - - - - - - - - - % - - - - - - - - - - - - -				%
1. Low	73.4	75.9	69.7	68.2	71.8
2. Medium	83.7	82.8	76.2	75.6	79.6
3. High-Lower	76.3	79.1	73.8	76.9	76.5
4. High-Middle	83.3	82.5	77.9	77.8	80.5
5. High-Upper	84.0	79.4	80.9	77.8	80.4
Average	80.1	79.9	75.7	75.2	77.7

LSD (0.05) Density = 3.0
LSD (0.05) Classification = 2.7
LSD (0.05) Density x Classification = ns

Table 4. Effects of seed class on the performance of Crisp 'N Sweet 710 supersweet corn. The effects are independent of the effects of seed class on plant stand, because plots were thinned to uniform stand. Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1991.

Treatment	July 19		At Harvest				
Seed Classification	Average Plant Height	Plant Vigor	Plant Numbers*	Number of Ears Harvested	Yield	15 Husked Ear Weight	Percent Culls
	cm	0-10			t/ac	lb	%
Large Flat	156.0	6.2	33.5	35.7	9.4	11.4	7.7
Extra Large Flat	156.5	6.2	33.6	35.8	9.2	11.3	11.6
Large Round	155.6	6.1	34.1	37.2	9.2	11.3	11.8
Extra Large Round	154.4	6.0	33.0	34.2	8.9	11.5	10.6
LSD (0.05)	ns	ns	ns	ns	0.36	ns	ns

* Based on 85 ft^2 in the plot interior replicated five times

Table 5. Seed density and performance of Crisp 'N Sweet 710 supersweet corn. These effects are independent from the effects of seed density on plant stand, because the plots were thinned to uniform stand. Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1991.

Treatment	July 19		At Harvest				
Seed Density	Average Plant Height	Plant Vigor	Plant Numbers*	Number of Ears Harvested	Yield	15 Husked Ear Weight	Percent Culls
	cm	0-10			t/ac	lb	%
1. Low	153.4	5.9	32.6	35.7	9.1	11.4	11.5
2. Medium	156.2	6.2	33.1	36.0	9.2	11.3	9.2
3. High-Lower	155.3	6.0	33.0	33.9	9.0	11.5	8.9
3. High-Middle	155.1	6.1	34.3	36.8	9.2	11.2	13.0
5. High-Upper	158.1	6.5	34.8	36.4	9.3	11.5	9.4
LSD (0.10)	ns	ns	1.48	ns	ns	ns	ns