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Effects of Post-Anthesis Detasseling on Fresh Market Sweet Corn in Rhode Island

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Prevention of bird damage to maturing sweet corn ears has become a major challenge for peri-urban vegetable producers in New England. The primary pests are large flocks of starlings, grackels, blackbirds, and crows. Propane cannons are the most common control method, as they are easily moved between planting blocks of sweet corn and require minimal labor. However, the cannons are extremely unpopular with non-farm neighbors, due to the incessant noise. In Rhode Island the use of propane cannons is protected by the “Right to Farm” legislation, but several communities have been threatening to file lawsuits to overturn the law and force a ban on propane cannons.

Anecdotal reports and unreplicated on-farm trials have suggested that bird damage to maturing sweet corn ears can be reduced or eliminated if the tassels and upper leaves are removed after pollination. Some bird species use the tassels as perches when feeding in corn fields. Other species are believed to be feeding on corn earworms and other insects, rather than the corn itself; detasseling facilitates application of insecticides to the ears. Sweet corn grown for processing in the Willamette Valley of Oregon is routinely detasseled after pollination to speed maturity and reduce lodging of plants following heavy rains. Detasseling does not affect yields of the standard processing cultivar, Jubilee, but it has been reported to reduce yields of other cultivars. The effects of detasseling on current fresh market cultivars is unknown.

This study was initiated by the Rhode Island Division of Agriculture, which has been considering recommending detasseling as an alternative to propane cannons for bird control. Detasseling is labor intensive, although options exist to mechanize the process. Harvest crews often prefer to work in fields that have been detasseled, as there is more air flow and it is easier to move between rows. Anecdotal reports indicate that detasseling speeds hand harvesting. Detasseling is compatible with mechanical harvesters that grasp the cornstalk from the base, but may not be compatible with models that grasp the tops of the cornstalks. Growers may be willing to adopt detasseling if it prevents bird damage without negative effects to sweet corn yields or quality, but they are unlikely to accept the added costs of detasseling if the practice also reduces marketable yields. The objective of this study was to determine how detasseling affects the fresh market sweet corn cultivars popular with growers in southern New England.

Materials and Methods

This study was conducted at the University of Rhode Island’s Gardiner Crops Research farm in the summer of 2015. Sixty cultivars, representing all common types, were included. Supersweet (sh2, shA, mirai, and SSS) cultivars and sugar enhanced (se) cultivars were planted in separate fields to prevent cross-pollination. Within each field, white, yellow, and bicolor cultivars were planted in separate blocks. Within each block, cultivars were grouped by days to maturity. All blocks were surrounded by 5 feet of buffer planted to the late maturing cultivars ‘Silver Queen’ and ‘Kandy Korn’. These cultivars mature 6 days later than the latest of the cultivars in the trial. To further ensure that buffer pollen would not contaminate the trial, the buffers were seeded one week later than the experimental plots.

The sugar enhanced trial was seeded the last week of May, and the supersweet trial was seeded in the first week of June. Spacing was 30 inches between rows, and 6 inches between seeds; plants were thinned to 12" spacing. Fertilizer was applied based on soil test results and recommendations in the New England Vegetable Production Guide, with nitrogen credit for winter covercrops of peas and vetch. No herbicide was used; weeds were controlled by cultivation until the corn reached 12 inches, and hand weeding throughout the season. We did not apply insecticides to control corn earworm or European corn borer. Spraying wasn't practical with the wide range of maturities and silking dates in each field, and we lacked the labor resources to inject individual ears.

Each experimental plot was 15 feet long, and consisted of four rows of corn (60 plants). Two rows in each plot were detasseled, and the other two rows were left intact (Figure). Each cultivar was represented by four plots. Data analysis compared the detasseled rows to the intact rows within each plot. Tassels were removed 5 to 7 days after the silks emerged on the primary ear by cutting the cornstalk two nodes above the top ear. This left one leaf shading each ear to prevent sunscald. Corn was harvested by hand beginning when all rows in each plot had mature ears. All plots in the sugar enhanced trial were harvested three times, with 2-3 days between harvests. All plots in the supersweet trial were harvested twice, with three days between harvests. Harvested ears were counted, weighed, and graded to remove ears that were obviously unmarketable due to size or damage. At the first harvest for each plot two marketable primary ears were randomly selected for quality analysis. The ears were husked, and ear length, weight, and diameter were measured. Kernels were cut from the center 6 inches of each ear, and 50 ml of kernels were weighed to determine kernel fresh weight. The kernels were then frozen for analysis of kernel dry weight and total soluble solids.

Results

As expected, there were significant differences among cultivars for all traits measured. However, the effects of detasseling were consistent across all cultivars and both types – there were no significant interactions. Detasseling reduced ear weight, number of harvestable ears per plant, and the percentage of ears that were marketable. Ears from plants that had been detasseled were 6 to 7 percent lighter than ears from intact plants, and the detasseled plants produced slightly fewer ears per plant. These effects combined to significantly reduce plot yields. For the sugar enhanced cultivars the yield was reduced 14% for weight, and 6% for number of marketable ears per plot. For the supersweet cultivars yield was reduced 16% for weight and 16% for the number of marketable ears.

Sugar Enhanced Cultivars

	Ear Wt (lbs)	Ears/plant	Percent Marketable	Total Ears/plot	Weight/ plot (lbs)	Marketable Ears/plot	Pct. 1st Harvest	Pct. Incompl. Poll.
Detasseled	0.715	1.19	84	36	25	30	60	18
Intact	0.784	1.24	86	37	29	32	55	14
Statistical Significance	***	NS	NS	NS	***	*	NS	NS

Supersweet Cultivars

	Ear Wt (lbs)	Ears/plant	Percent Marketable	Total Ears/plot	Weight/ plot (lbs)	Marketable Ears/plot	Pct. 1st Harvest	Pct. Incompl. Poll.
Detasseled	0.77	1.1	84	34	26	29	64	23
Intact	0.82	1.3	88	39	31	34	70	6
Statistical Significance	**	***	**	***	***	***	*	***

Statistical Significance: NS $P>0.05$, * $P<0.05$, ** $P<0.01$, *** $P<0.001$

Detasseling has been reported to speed maturity of the developing ears. We examined the distribution of yield across harvests to test the effects of detasseling on maturity. Effects were slight, and mostly not statistically significant. For the sugar enhanced cultivars, 60% of the ears in the detasseled rows were ready on the first harvest date, as compared to 55% for the intact rows. For the supersweet cultivars, the effect was reversed, with 64% of the ears in the detasseled rows ready on the first harvest date, and 70% of the ears in the intact rows. If detasseling does speed maturity, it is likely only by a day or two.

Detasseling had no effect on length, diameter, or weight of the husked ears. It also had no effect on either the fresh weight or the dry weight of the kernels, or on the total soluble solids content. Detasseling did affect the incidences of incomplete pollination, with the supersweet cultivars being more strongly affected. Twenty-two percent of the ears sampled from detasseled plots in the supersweet trial had incomplete pollination, as compared to only 5% of the ears sampled from the intact plots. The incidence of incomplete pollination was also higher in detasseled plots in the sugar enhanced trial, but the difference was much smaller and not statistically significant.

It is not clear why the differences in ear weight disappeared after husking. The weight differences persisted when only the data from the first harvest were analyzed, suggesting that detasseling affects the weight of the first ear on each plant, as well as the weight of later ears. It is possible that the sample size was too small to detect the difference in the husked ears, but it is also possible that the weight difference is primarily due to increased husk weight in ears from intact plants.

In conclusion, detasseling does not appear to significantly affect quality in fresh market sweet corn, but it does reduce ear weight, the number of harvestable ears per plant, and the percentage of ears that are marketable. Detasseling also increases the incidence of poor tip fill and other forms of incomplete pollination. This tendency would likely be exacerbated if entire 10-acre blocks were detasseled, since in this study pollen remained available from the adjacent intact rows, as well as surrounding plots with later silking dates. The effects of detasseling on yield could be negligible in production systems where only the primary ear is harvested, and the harvest is sold by count. However, the economic consequences could be substantial if the corn is sold by weight, or if all ears are harvested. The 5 marketable ears lost per plot in the supersweet trial translates to 14,500 ears lost from a 10-acre block. These data suggest that detasseling has greater effects on the yield of supersweet corn than on the yield of sugar enhanced corn, but further testing is required to confirm these results as the two trials matured under different conditions.