Genetically Engineered Sugar: Sweet Deal or Risky Meal?

Olivia Wagendorf is an 8th Grader at Park Christian School in Moorhead. This spring, she conducted a study targeted at answering the following hypothesis: “If sugar is made from genetically-modified sugar beets, then its composition and purity will be no different than that which is made from sugar beets that have not been modified in any way, or sugar that is produced from cane – and this may influence consumers to purchase and consume sugar irrespective its origin or growing practice.”

In other words, Olivia’s study attempted to answer the question that is on the minds of many U.S. consumers: Is genetically-engineered sugar a “sweet deal”, or is it a “risky meal”? Olivia asked for, and was given permission to work with members of American Crystal Sugar Company staff at the Technical Services Center in Moorhead. Using a laboratory and ion chromatography equipment at the Center, she attempted to determine whether any differences in chemical composition could be detected between sugar from GMO and non-GMO beets, or from sugar cane.

Ion Chromatography is a standard process used in chemical analysis to identify proteins or other charged molecules in the food and beverage, environmental, pharmaceutical and other industries.

Olivia’s paper was written in a very objective and thorough manner. She addressed a number of reasons why GMO sugar might make for a “risky meal”:

- 2-4 percent of the DNA in a genetically modified plant is made different from its original, potentially causing creation of new toxins, allergens, carcinogens or anti-nutrients.
- Cows and other livestock are fed pulp from the sugar beet. If there are contaminants in the GMO sugar beet, the same are getting into cow feed and subsequently could be found in the meats that people consume.
On the “sweet deal” side of the ledger:

- Regulatory agencies around the world, including USDA and FDA, have reviewed and confirmed that the sugar and end-products derived from GMO sugar beets are the same as the food and feed products derived from other comparably grown sugar beets.
- Biotechnology has helped farmers grow 311.8 million tons more food in the last 15 years. Productivity in GM crops has delivered gains that are 7-20 percent higher than conventional varieties (which are on average 33 percent higher than organic yields).

After carefully running her experiment under the watchful eye of American Crystal Chemist Bev Jacobson, Olivia came up with three chromatograms. The graph depicting the structure of the sugar derived from GMO beets, and the graph on cane sugar were essentially identical. The graph below overlays lines depicting both products. The red line is in fact two lines, indicating that there is no difference in the chemical composition of sugar from GMO beets and sugar from sugarcane.

Olivia made a number of conclusions from her work:

- Other studies confirm what she found in the American Crystal lab – that there is no evidence of the protein which confers Roundup tolerance to the H7-1 Roundup Ready sugarbeet plant, and no allergen or transgenic sugarbeet DNA in the sugar from genetically modified sugarbeets.
- All things considered, genetically modified sugar beets are a sweet deal.

Olivia’s thorough scientific approach is to be commended. Her efforts resulted in her winning First Place at the Park Christian science fair, First Place for Junior High students at the regional fair, and Honorable Mention at the Minnesota state competition.

Congratulations, Olivia, on a well-thought-out, SWEET project! American Crystal wishes you well in what could be a very rewarding career in science.