



Seeding a Healthier World

From hypo-allergenic peanuts to trans fat-free soybean oils, the seed industry is poised to improve human health and well-being.

By Ellen C. Wells

LIKE THE INNOVATION OF VACCINES, which have helped reduce the incidences of deadly diseases worldwide, the results of seed research and development through both traditional breeding and biotechnology promise to help human societies combat their most pressing health and wellness problems. The seed industry is poised to contribute greatly toward creating healthier populations.

Seed breeders confront a number of hurdles in their pursuit of healthier crops. The possibilities of low returns on investments, consumer and retailer disinterest, unfavorable crop agronomy and societal rejection of foods that are “different” or bioengineered can end projects that started with such promise. Despite such obstacles, by working in collaboration with other stakeholders along the market chain, the seed industry is persevering in order to help create better health and better lives.

Obesity, Heart Disease and Diabetes

The major health issues facing the developed world, and specifically the U.S., are obesity, diabetes and cardiovascular disease. The cost of these health problems to U.S. society equals 1% of this country’s gross domestic product, which is estimated to be \$1.1 trillion. Consumers know that a high fat diet poses risks to their health and quality of life and are worried about the types of fats their foods contain.

Seed and crop researchers are hearing these concerns. “What we are doing is looking at how we can use soybeans to make foods healthier,” says Geri Berdak, director of Public Affairs for Monsanto. “How can we increase the nutritional profile of these foods to help prevent disease and address health concerns in the developed world?”

One solution is trans fat-free oils. For example, Monsanto offers a variety of soybeans under the Vistive umbrella. One kind produces a low linolenic oil used in frying applications, while a high sterate version produces trans fat-free oils used in the baking industry. Berdak says more than 100 companies are now using the oils produced from Vistive soybeans. A third Vistive soybean will have even greater stability. Another avenue of Monsanto’s soybean work is researching oils that contain high levels of Omega-3 fatty acids, shown to help with cardiovascular health and brain function.

Many food companies are used to working with soybean oils and seek to maintain that same soybean flavor and functionality in a healthier, trans fat-free oil.


“As people move toward a much healthier diet there are ways through plant science to deliver nutrition in more novel ways than what we may currently have today,” says Brent Javra, Business Development Leader for Dow AgroSciences. Dow and others, he adds, take their cues from emerging consumer trends, and Dow itself has a significant trans fat-free oil business with its Nexera line. “It takes many years and a big investment to start making those changes and addressing those trends,” Javra says. “You need to work very closely with food manufacturers so it doesn’t catch them by surprise.” By working with food companies, health agencies and others, they come to understand the specific needs of both the food industry and consumers in order to develop the seed to meet the end-users’ needs.

Value Chain Creation

A challenge of bringing functional foods to market is “getting the value chain organized, and that’s not an insignificant task,” says David Dzisiak, Commercial Leader Oils for Dow AgroSciences, referring to growers, processors, food companies and the logistics connecting them. Dzisiak adds that Dow had to build a body of data to help food companies understand the functionality and benefits of the oils, while also ensuring a reliable supply. Growers also need to know a market will exist for the product and, Dzisiak notes, identity preservation at the processing level is also a big challenge.

It affects more than just the oil business. For several years now, health officials have recognized the cholesterol-lowering benefits provided by beta-glucan found naturally in oats and barley. Researchers at North Dakota State University have developed an oat variety called Hi-Fi that has roughly 50% more of this beneficial soluble fiber.

Ceres Organic Harvest, a creator of supply chain partnerships for small organic grains, has obtained a licensing agreement to exclusively market Hi-Fi for the organic sector. “As a company, we’ve always had an interest in whole grains that provide consumers with the most nutrition,” says Kathryn Begeal, director of Ceres’ Hi-Fi program. “Because of the high levels of soluble fiber in Hi-Fi, we saw an opportunity to identity-preserve and brand this value-added oat.” And with both grower performance and health benefits, she says, “it’s a win for the farmer and for the consumer, too.”



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Powerful Veggies

Some vegetable breeders are addressing health issues by developing crops with enhanced nutrient profiles. Elizabeth Pivonka, President and CEO for Produce for a Better Health Foundation, believes fruits and vegetables are already beneficial for health. “It’s not just what fruits and vegetables have in them that’s important,” she says. “It’s the fact that they displace other foods in the diet. If you’re eating fruits and vegetables you’re not eating as much junk food, for example.” She feels the seed industry needs to address some of the barriers such as convenience and taste that prevent vegetables and fruits from being consumed at the recommended levels. And, she suggests, “don’t lose anything in the process from a nutrient standpoint.”

According to Sekhar Boddupalli, Consumer Research & Development Leader for Seminis, vegetable breeders are working on crops with enhanced nutrient density, but they also recognize nutrient density alone won’t drive consumption of vegetables. “Consumers are looking for vegetables to be appealing from a taste, texture and color point of view. Delivering vegetables in a more convenient way is also going to be key to increasing vegetable consumption.”

Seminis is addressing appeal, convenience and nutrition in a number of crops: lettuce with taco-shaped leaves to replace breads; cherry grape-sized tomatoes with a higher lycopene content; and vitamin-A enhanced carrots in a mix of colors that will aid in glucose management. The company is also developing broccoli varieties with higher levels of nutrients that can help enhance the body’s ability to fight against stress that can lead to cancer, diabetes and cardiovascular diseases. Within this research, Boddupalli points out, Seminis must also make sure the enhancements meet the needs of its key customers – the growers – from a profitability standpoint.

Global Impact

The work of seed and crop researchers may have the most profound impact on the health of developing countries, where a lack of nutrients and stable crops puts whole populations at risk. Many of these projects use the gene-splicing techniques of biotechnology.

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– Greg Jaffe

The most well-known of such projects is “golden rice”, an orange-hued rice with increased beta carotene levels that researchers hope can address blindness caused by vitamin A deficiencies in many Asian diets. Other projects addressing global health issues include folate-rich tomatoes and staple crops that may combat birth defects and folic-acid-related deficiencies; bananas that contain a Hepatitis B antigen, effectively rendering it an edible vaccination; and more easily digestible sorghum, a common grain in African diets. Even peanut allergies are being addressed.

These projects are ongoing and not necessarily slam dunks. For instance, golden rice has yet to be grown as a crop more than seven years after its unveiling. It was criticized for not containing enough beta carotene to make a difference toward correcting deficiencies. “There are other factors that you can’t forget to consider,” says Greg Jaffe of the Center for Science in the Public Interest’s Biotechnology Project. “There may be cultural, social and religious reasons” behind people being apprehensive to eat rice that isn’t white. Jaffe points out that nutritionally enhanced products also add a layer of complexity. Is it digested similarly? Does it remain nutritionally viable after cooking or processing?

“There’s lots you can engineer into products, but can you make a direct correlation between that and it actually having a nutritional advantage?” Jaffe asks.

Research of enhanced foods is still in its infancy, but already we can see this work will pose more questions as it addresses additional health concerns. “As a food industry, we should be socially responsible for developing products that not only have economic value to the industry, but also bring value to the consumer as it relates to health and wellness,” Boddupalli says. “There are key partners and stakeholders that need to come together to say this is an important social movement in which we need to participate.” **SW**

Marketplace Challenges:

- 1) Breeding for specialty traits may mean a yield drag, so it's harder to get farmers to produce them.
- 2) Creating a “closed loop” system to protect the value of a specialty trait and keeping it segregated.
- 3) Understanding consumer needs and conducting consumer research.
- 4) Appreciating cultural sensitivities about food.
- 5) Getting food approvals such as GRAS status or labeling approvals.



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