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The Scariest Veggies of Them All

By [Jack Kaskey](#) November 21, 2013

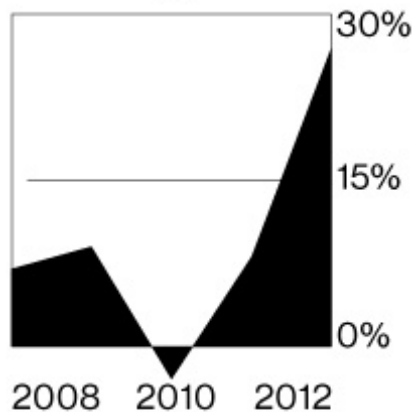
Last July, when Monsanto ([MON](#)) withdrew its applications to sell genetically modified biotech seeds in the European Union, the move opened the way for competitors to challenge Monsanto's market share.

As opposition to genetically modified crops has spread across Europe and the world, leading chemical companies including BASF ([BASEY](#)) and DuPont ([DD](#)) have turned to mutagenesis—a technique that mimics the sun's irradiation of plants—to create herbicide-resistant crops. The process, which faces almost no regulation, creates opportunities for companies to grab a bigger share of the \$34 billion global commercial seed market. But some scientists say mutant crops are more likely to pose health risks than genetically modified ones.

Mutagenesis isn't new: Breeders have relied on it for decades to produce thousands of varieties of lettuce, oats, rice, and other crops. BASF today licenses its technologies to 40 of the world's biggest seed companies, including DuPont and Switzerland's Syngenta ([SYENF](#)), which in turn sell high volumes of mutant breeds, ranging from wheat to sunflowers, in markets that reject genetically engineered seeds.

Earnings at BASF's agriculture unit rose 27 percent in 2012 from the previous year, partly because of higher demand for mutant seeds in Eastern Europe, according to the company's latest annual report. "The flexibility is there to use this technology quite broadly," says Jonathan Bryant, vice president of the global strategic marketing group for herbicides at BASF. "Because it's a conventional breeding technique ... it's very amenable for a wide range of seed companies."

BASF operating income growth



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How much of a challenge does this pose to Monsanto? The world's largest creator of genetically altered crops—it develops and sells seed produced by farmers it contracts with—accounts for a sizable chunk of the global seed market.

It had \$14.9 billion in sales in fiscal 2013; \$10.3 billion of that was from the sale of seeds and genetic licenses. The St. Louis-based company doesn't break down sales figures, but it says most of its seed revenue comes from genetically modified organisms.

While earnings have grown at a rate of more than 20 percent the previous three years, Monsanto faces increased regulation and bans of its GMOs in some countries as well as political hurdles that can delay product launches for years, or indefinitely.

The EU has approved planting only one of Monsanto's genetically modified crop varieties in two decades, prompting its decision to withdraw eight pending GMO requests last summer. It's not the only company confronting roadblocks with GMOs in Europe. BASF last year decided to move its plant science division, dedicated to engineered crops, to the U.S. from Germany. Even in the U.S., bills pending in 26 state legislatures and before Congress would, if passed, require labels on genetically modified foods. No such disclosures are required on ingredients derived from mutant crops.

All breeding techniques can create plants with increased levels of naturally occurring toxins or with proteins known to cause allergic reactions. Reports from the National Academy of Sciences, representing the consensus of experts in the field, say the risk of creating unintended health effects is greater from mutagenesis than any other technique, including genetic modification. Mutagenesis deletes and rearranges hundreds or thousands of genes randomly, spawning mutations that are less precise than GMOs. The academy has warned that regulating genetically modified crops while giving a pass to mutant products isn't scientifically justified.

The risks associated with mutagenesis, the academy also says, are small relative to the incidence of food-borne illnesses such as salmonella. BASF maintains the crops are safe for consumers and the environment. "This has been a technique used for many decades without issue, without concern," Bryant says.

In addition to the regulatory-free environment they operate in, mutant crops are also gaining in popularity because they're cheaper to produce. Monsanto spends anywhere from \$150 million to \$200 million to launch a single genetically engineered product. Japan, by comparison, invested \$69 million from 1959 to 2001 on mutant breeds that yielded \$62 billion worth of products over that period, according to data from the United Nations' Nuclear Techniques in Food and Agriculture program.

"These difficulties in getting a GMO to the market, we don't have it in mutation breeding," says Pierre Lagoda, who heads up the UN program. That's spurred even more interest in the mutant varieties, he says. In 2013 alone, Lagoda's program has received requests to help irradiate a record 31 plant species ranging from sugar beets from Poland to potatoes from Kenya.

"The current regulations are a huge incentive to go back and do things the old way," including mutagenesis, says Wayne Parrott, a professor of crop science at the University of Georgia in Athens. Monsanto has also used mutation breeding, says the company's chief technology officer, Robb Fraley.

Industry experts say breeding and biotechnology are starting to converge. Over the past five years, breeders have increasingly used molecular markers and sequenced genomes of corn and other crops to improve crossbreeding, making conventional breeding more like genetic engineering. "There is not a black line between biotechnology and nonbiotechnology," says Paul Schickler, president of DuPont's Pioneer seed unit. "It's a continuum."

The bottom line: *Mutant breeding is boosting BASF's sales and challenging Monsanto's dominance in the global seed market.*

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