

Can next generation crop precision editing avoid marketing pitfalls of GMOs?

Next-generation precision gene editing biotechnologies like CRISPR-Cas9 and RNAi are more efficient ways to engineer variants for crops, medicine, biofuel and other uses. Publications like *Genetic Engineering News* have hailed these innovations as “the [Next Magic Bullet](#),” largely because they do not involve the introduction of so-called “foreign genes” — genes from one species transferred into another, which has been the central source of concern voiced by many GMO opponents.

But that hasn’t stopped those opponents from trying to blur the science, and attempting to frame public discussion in a way that views these new technologies as a form of GMOs when they are not. Concerns have been fanned by experiments on embryos in China, which has raised questions about the appropriateness of making inheritable germline edits.

Opposition is coming most vociferously from anti-GMO groups like Earth Open Source, a Maharishi cult funded NGO based in Europe (see its Genetic Literacy Project [profile here](#), which [recently tried to make the claim](#) that CRISPR wasn’t any more “accurate” than older recombinant DNA technology:

In (an) investigation using human cells, CRISPR was found to cause unintended mutations in many regions of the genome. Biotechnologists still know only a fraction of what there is to be known about the genome of any species and about the genetic, biochemical, and cellular functioning of our crop species. That means that even if they select an insertion site that they think will be safe, insertion of a gene at that site could cause a range of unintended effects.

Scientists who are actually doing this research dispute this simplistic caricature. Regardless, the cult’s description has little to do with the use of the technology in plants. The Medical Research Council in the UK has publicly stated that CRISPR and gene drive technologies do not pose a [biosafety risk](#).

But the media has been particularly fumbling in its coverage, mashing together stories on CRISPR with concerns about GMOs. [This extensive one](#) in Newsweek discusses CRISPR, but then cites opposition to earlier GMOs, while never addressing the uniqueness of the newer technology. Some scientists, including the developer of the refined CRISPR-Cas9 technique, have called for a [temporary moratorium](#) on the applications of CRISPR in the human arena until more experiments and public discussion takes place.

Going forward, public acceptance will require [addressing fears](#), benefits and the mental connections people make with certain scientific advances. It will be, in short, about marketing and persuasion.

Data meets marketing

Science, particularly the science of food, hasn't done well in this area. Scientists have tended to avoid the business of sales and persuasion, even though the modern concept of marketing probably got its start in agribusiness. In fact, a look back at how scientists, companies making science-based products, and public interest groups have handled public perceptions of their new inventions could help find more effective ways to gain acceptance of this latest "magic bullet."

In 1992, an trade organization called the [International Food Information Council](#) (IFIC) began looking at how Americans perceived the relatively new farming and food technologies arising from taking DNA from one organism, and splicing it into another. The IFIC hired a marketing research expert named [Clotaire Rapaille](#), who had worked with a number of large corporations to help them brand themselves or change their public image. Rapaille was known for applying the concepts developed by Swiss psychiatrist Carl Jung, particularly the notion of [archetype](#). An archetype is at once an ideal, symbol and even a person that all add up to how a person perceives him/herself and others. Today, many marketing firms use archetypes in their work, but at the time, this was something new.

To arrive at the types of perceptions provided by creating these archetypes, Rapaille interviewed groups of people to get a sense of how they perceived many issues, including biotechnology and food. What [he found](#):

Americans have powerful and vastly different forces shaping their attitudes and behavior toward food biotechnology. Our companies, processes and products have the possibility of being viewed in entirely different ways, depending on how we act and communicate with the public. In one case, we have tremendous public support – we can be viewed as farmers bringing new varieties and improved foods to consumers. But if we do not position ourselves and our products correctly, we can just as easily be viewed in the same class as Hitler and Frankenstein.

Good words, bad words

The interviews identified certain words to use — beauty, bounty, choices, cross-breeding, diversity, earth, farmer, future generations, heritage, improved, purity, "natural genetics" and even organic — as the best ones to promote biotechnology. Words to avoid included biotechnology, chemical, DNA, laboratory, pesticides, safety, and even scientists.

But marketing and public relations efforts from manufacturers, non-profits and yes, scientists, have tended to overlook these recommendations. In part, that's because, unlike the messages from anti-GMO activists, the marketing claims of food makers are regulated, and the traits of these products are tested and approved (or not) by the FDA. But that still has left room for some creativity.

My risky business versus your risky business

How do experts perceive risk differently than the public and why is that important?

Paul Slovic, president of Decision Research, psychology professor at the University of Oregon and an expert on risk analysis, has shown that experts assess risks based on two factors: probability and magnitude of adverse consequences. The public, on the other hand, makes a much more complicated assessment. For the public, it was important for the public to perceive risk as voluntary, that it was familiar to people, known both to scientists and those exposed, and was experienced by everyone. As Slovic warned as early as 1991 in a document published by the [National Academies of Science](#):

One would also expect that the benefits of many non-medical applications would not be apparent to the public, no matter how obvious they appear to scientists and industrialists. When benefits are not perceived as significant, the public is intolerant of any risk, even a small one.

The anti-GMO movement has done a good job in creating the impression that the benefits of genetic engineering flow to corporations and farmers and will not help address global food concerns, as biotech supporters often claim. In other words, the world is not starving without GMOs, not right now.

Potential open market

Despite the heavy, fear-laden “it’s not proven safe!” rhetoric from such activists as the Food Babe, Natural News and Consumer Reports, most Americans don’t have a firm mindset on GMOs, and have probably not even heard of next-generation technologies like CRISPR or RNAi. Polls from the [IFIC](#), [Pew](#) and [Rutgers University](#) similarly show fertile ground for marketing and persuasion efforts. More than half of respondents to these polls indicated they knew nothing (or next to it) of genetically modified food and when asked if they want any additional information on their food labels, only 7 percent volunteered GMO labelling.

Since his 1992 work with IFIC, Rapaille in 2006 published what he called a “[Culture Code](#),” a brand name-meets archetype concept that sums up what people perceive about a certain issue, product or person. For food (among Americans), Rapaille’s “culture code” was simply “fuel.” Like the poll responders, most Americans were not as concerned about the process of food making, where their food was made or grown, or whether or not it was natural, organic or genetically modified. What they wanted most was a full meal. The food movement has grown tremendously since then, however, and chefs are now television stars, so it’s not clear if polls would still show such a blasé attitude toward food. But the results do suggest Americans have a practical side when it comes to food innovation — and they could provide an opening for those seeking acceptance of gene editing and other new generation technologies.

For the future of biotech (at least agriculture), there remains a potentially large group of people who have not made up their minds about early generation GMOs, and might be able to accept the newer generation of technologies that do not involve splicing of “foreign” DNA into an organism and so far are not subject to the same regulations as early versions of genetic engineering. Words, emotions and qualitative perceptions will matter as much as, and perhaps more than, data or “getting the science right.”

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