

What do off-patent GM soybeans say about possibilities of open source biotech?

March of 2015 marks the beginning of a new era in genetically modified foods. It's the first year farmers can plant a generic version of glyphosate-resistant soybeans—the first GMO to be patented by Monsanto in 1996. There are some caveats to this, but it's also a case that many no longer neatly fit the anti-GMO meme denouncing large agribusiness for holding intellectual property rights over seeds.

For many opponents to GMOs, patents are a key point in the fight. The Organic Consumers Association, a lobby group, is concerned about the corporations the right to patent plant life. In a blog post, two of its leaders [asked](#):

Why have we surrendered control over something so basic to human survival as seeds? Why have we bought into the biotech industry's program, which pushes a few monoculture commodity crops, when history and science have proven that seed biodiversity is essential for growing crops capable of surviving severe climate conditions, such as drought and floods?

It cited environmentalist and anti-GMO crusader Vandana Shiva, saying “we have turned seed, which is the heart of a traditional diversity-rich farming system across the world, into a powerful commodity, used to monopolize the food system.”

The Center for Food Safety, an environmental advocacy organization critical to GMOs, argues that the current patent regime has led to further [consolidation of the seed industry](#) and a corresponding increase in seed prices.

But concerns about patents don't neatly fit into two camps—pro-GMO or anti-GMO. It's a bigger story than that, and GMOs are just one of the main actors. In the U.S., Europe and many other developed countries, patents can be owned for any seed—GMO or not.

Jim Myers, a professor of vegetable breeding and genetics at Oregon State University, said that one downside to patents is that they can leave researchers' hands tied. “Before patents, there was a lot of innovation that came out of trading germplasm [the genetic material of a plant]. Now, everyone has their own set of material that they do not share. . . . My sense is that we're missing something here because of the lack of access to each other's programs,” he [said](#).

Rep. Marcy Kaptur, a Democratic from Ohio, believes that patent law needs to be revised, though not completely abolished. She has four times introduced legislation that would put the USDA in charge of setting and collecting royalties on seeds from growers, including on seed that was saved. Her intent is to make those fees lower than those currently charged by Monsanto and other seed companies. “Companies deserve a fair return, not an exorbitant return,” she [said](#). “Monsanto did not invent the soybean. God did. I'm not completely on board with the idea that any company should control to that extent the reproduction of a food crop.”

Given these sharp critiques, it's important to point out why patents are in place. Hybrid seeds have been

patented since 1930 and are embraced worldwide as necessary to foster innovation in agriculture. A tremendous investment is made by private companies to develop and bring hybrid and genetically modified seeds to market. The Supreme Court and numerous international tribunals have maintained time and again that without patents much of this innovation would not be possible.

Wendelyn Jones a professional for DuPont's global and regulatory affairs [cited](#) a 2011 survey, which found that the average cost of new plant biotechnology traits introduced between 2008 and 2012 was \$136 million. Additionally, the average length of a product from discovery to commercialization is 13 years. That kind of investment is difficult without some form of guarantee that the investment would be protected.

But, agribusinesses have also gone to great lengths to assert their intellectual property right, earning them a notorious reputation. Monsanto has sued 140 farmers for saving Round-Up Ready soybeans. One [whose dispute with Monsanto reached the Supreme Court](#) is Indiana farmer Vernon Bowman.

Bowman purchased soybeans from a grain elevator typically used for animal feed or processing to plant a second crop during the same growing season. He argued that since farmers had paid the technology fees once before that Monsanto shouldn't be allowed to collect them a second time. The courts ruled in favor of Monsanto.

It is this kind of the concentration of corporate power in the food system that activists decry.

So, now that the first GM seed is off patent, what does that indicate for the future? Can it lead to the fairer food system that food justice activists are taking about?

Frederick Kaufman, the author of [Bet the Farm: How Food Stopped Being Food](#), [wrote](#) that food justice advocates, who often vilify GMOs, should take a different tack on how to change the food system:

Open-source GMO is a new idea for food justice activists, who have been concentrating their efforts on depleting Monsanto's market share through consumer advocacy and political reform. ...But genetic modification does not equal Monsanto and Pioneer. The time has come to separate the dancer from the dance and admit that it is possible to be against big-agriculture and for scientific advancement.

Ramez Naam, a computer scientists and futurist, [wrote](#) rather positively about the potential for open source biotechnology as GM traits go off-patent: "I believe this is the beginning of a new era in genetically modified crops, one of much more diversity as the cost of research drops, as more work is done by non-profits, and as more and more patents expire."

He predicts a biotechnology revolution that hinges not on monopoly but on open competition that will help



Indeed, already there are examples of a budding open source

biotech movement. The rice genome sequencing completed in 2004 was one of the first crop genomes to be made freely available to researchers as part of a collaboration including a group of public research centers around the world. And today the genomes of many [crops local to Africa](#) are being sequenced and made openly available to researchers.

While this access to the genome helps to speed solutions, it doesn't prevent companies from licensing the products that they create, so while it encourages sharing it's not a complete win.

Kaufman brings Séverine Dusollier's work to the conversation. Dusollier is an intellectual property rights activist who [noted](#), "The rice genome project placed masses of information into the public domain, most of which enabled private companies to develop applications such as genetic markers, specific genotypes related to nutrition, new quality of fibers, or targets for herbicides for which they filed a patent application."

The soybean's expiring patent could be seen as an encouraging sign that open source biotech is a possibility, yet it likely just means a small window of opportunity for farmers to benefit from the generic soybeans within certain parameters.

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First, seeds may contain multiple layers of patent protection. Many companies own rights to

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germplasm, which applies to any seeds and not just GM seeds.

In the case of Monsanto's soybean, seed companies can license the trait from Monsanto but use their own seed varieties, which may also be patented. Therefore, farmers wishing to replant generic glyphosate-resistant seed should double check with their seed supplier before doing so.

Truly, it would take much more than patents ending for GM traits for an open source movement to thrive. Some scientists have given some effort to see what it would take to free the seeds themselves.

The Open Source Seed Initiative (OSSI), led by public scientist Jack Kloppenberg at the University of Wisconsin, has discovered how tricky it is to define [open source commons for seeds](#) the same way as the software open source movement. The finer points of legally writing a user agreement have proven trickier than initial conceptions of the movement since the laws governing intellectual property rights of plants and software are different, making replicating the open source software movement more difficult than it seems.

Additionally, the OSSI might be effective for vegetables, which have less patents out on them already, but germplasm for commodity crops is already largely patented. The revolution, therefore, must happen fast, said Irwin Goldman, a University of Wisconsin vegetable breeder: "Open source still has a chance with vegetables, but our window is only as long as the bottleneck at the patent office. It could be a matter of



hat has happened with corn happens with crops like carrots and onions.”

However, not all versions of the generic herbicide-resistant soybean would

continue to limit farmers from seed saving. For example, the University of Arkansas [announced](#) the release of the first public variety of soybeans with the Round-up Ready trait for this spring's planting. There will be no technology fees and farmers can save seed from this year's harvest to plant the seed next year, if they wish.

A second potential hurdle for off-patent GMOs is the regulatory responsibility necessary for transgenic crops in the global export market. The impact of not addressing the export market could be financially devastating. Currently, 90 percent of cotton, corn and soybeans grown in the U.S. are genetically modified. The value of these crops in global trade is over \$40 billion annually. If there are any gaps in regulatory authorization, which is usually handled by patent holders, trade to a particular country could stop. Typically, a company like Monsanto provides support for continued testing and provides data to regulators to maintain approval of specific crop traits.

A possible solution for this is called the [AgAccord](#), a group of stakeholders to assume regulatory responsibility for agricultural biotech products as they expire. While there are not a lot of other crops that will go off patent in the next five years, the number of patents on record expiring after 2021 goes up significantly. The AgAccord includes two different agreement options—stakeholders can sign one or both—that will provide the support necessary for farmers to export their crops.

Monsanto has signed one called the Generic Event Marketability and Access Agreement and agreed to maintain international regulatory support for the first generation of Round-up Ready soybean through 2021. Other stakeholders have also signed, including the American Farm Bureau Federation, the American Seed Trade Association, the American Soybean Association, BASF Plant Science, Bayer CropScience, Dow AgroSciences, Dupont Pioneer, Gro Alliance, and the National Corn Growers Association.

Under the agreement, institutions must provide notice of a patent ending three years before the expiration.

They then have a few choices for how involved they will be in maintaining global regulatory responsibility. Patent holders don't necessarily have to provide any support, so it certainly doesn't end the all-powerful corporation meme. But before the Ag Accord, there was no legal framework to facilitate off-patent genetic traits in crops.

Monsanto's indication of support through 2021 could signal a standard that would make it difficult for other patent-holders to not assume some continued responsibility. Additionally, incentive to push back on a negative PR image could also indicate future global regulatory support for other off-patent crops.

However, it is regulatory responsibility that makes Karl Haro von Mogel, a plant geneticist in Madison, WI, think that open source biotech faces some significant hurdles. He is skeptical that public institutions, which are often behind open source products, could maintain international regulatory approvals for GMOs perpetually. As an alternative, farmers could pool resources to pay for maintenance of regulatory approvals, he [said](#).

The tight global regulatory regime certainly doesn't help foster innovation and doesn't help open source efforts. Founding director of the FDA's Office of Biotechnology Henry Miller has long had some sharp things to say about the regulatory regime. He [wrote](#):

Billions of dollars have been squandered by the public and private sectors on complying with superfluous, redundant, unscientific regulatory requirements that have priced public sector and small-company R&D out of the business.

These inflated development costs are the primary reason that more than 99% of genetically engineered crops that are being cultivated are large-scale commodity crops—corn, cotton, canola, soy and sugar beets.

This concentration of industry efforts has stifled many efforts at creating genetically modified “specialty” crops, he said. An exception is the genetically modified Hawaiian papaya.

So for now, what soybean farmers have is a window of opportunity. And while open source biotechnology could push that window further open, it remains to be seen whether the movement will blossom into something fair for farmers and beneficial for society as proponents hope.

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Additional resources:

- [Patents and GMOs: Should biotech companies turn innovations over to public cost-free?](#) Genetic Literacy Project
- [Seed patent primer: Is the use of GMOs preventing farmers from reusing their seeds?](#), Genetic Literacy Project
- [Do patents limit GMO research and farmers choice? Only a little](#), Washington Post
- [Can Syngenta help make open-source GMOs a reality?](#) Genetic Literacy Project

- [Genetically Monetized Food](#), Slate