Should genetically engineered seeds be patented?

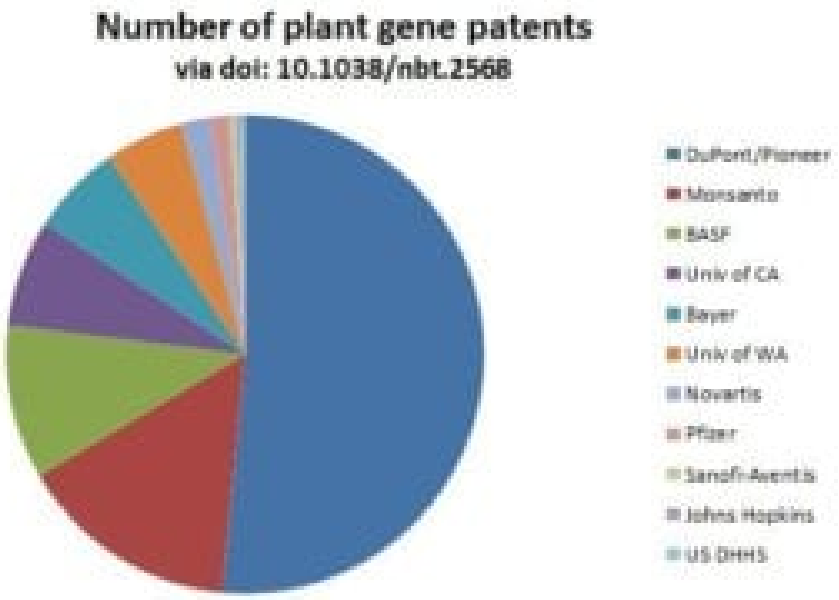
GMO critics contend that patenting genetically engineered seeds is akin to patenting life an argument never used against organic non-GMO conventional farmers who have used patented seeds for decades. Some argue that seed patents go against the essence of an agriculture system built by farmers throughout the centuries. Today's new seeds would not be possible without the work of those farmers, and nature, according to the NGO SeedFreedom:

> *A patent is an exclusive right granted to an inventor to make and sell the patented product. Patent prevent farmers from saving or exchanging seed, therefore, undermining the farmers' rights or seed sovereignty. Patent creates monopolies, which undermine the choice of farmers as well as all citizens as eaters. A seed is not an invention. That is why patents on seeds are illegitimate. Even in a genetically engineered crop, the original seed come from farmers. Patents on seed are therefore based on biopiracy.*

Yet patents have been around longer than GMO seeds, for most of a century. In fact, outside of older heirloom varieties, most seeds today start with some form of patent protection though some breeders release them without restrictions into the public domain, according to Jim Myers, professor of vegetable breeding and genetics at Oregon State University:

> *In all but a few cases, all contemporary varieties developed by private breeders are protected, and most public varieties are protected as well.*

The U.S. Patent and Trademark Office maintains a database of all patents, granted or expired. The database is filled with patents for virtually every type of plant for which there is a commercial market. Here and here are two unofficial databases of patented seeds, with the vast majority having nothing to do with GMOs. Monsanto, the familiar target of anti-patent activists, holds a fraction of seed patents, with DuPontPioneer holding more than half of active patents.



Source: Biology Fortified

Any lingering questions about whether genetically engineered seeds could be patented was effectively settled in the United States in 2013, when the U.S. Supreme Court issued a unanimous verdict on the question of whether companies such as Monsanto have the right to patent their seeds. The case involved Indiana farmer Vernon Bowman, who attempted to circumvent Monsanto's soybean patent, using what he thought was a loophole in the law.

When farmers buy seeds from Monsanto, or any of its competitors, they sign a contract that, among other things, prevents them from saving or re-using seeds. (Examples can be found here and here.) While Bowman bought Monsanto seeds for his main crop, he chose an unconventional pathway to secure seeds for a second planting. He went to a local grain elevator and purchased a load of soybeans being sold as animal feed. More than 90 percent of soybeans in the US are genetically modified, most to be resistant to the herbicide glyphosate, sold by Monsanto as Roundup. Bowman planted the seeds and sprayed them with Roundup, hoping there would be a large haul of "free" Roundup-Ready beans in the lot. He used seeds from the surviving plants for his second planting.

Monsanto discovered his circumvention of the agreement and sued. Bowman tried to argue "patent exhaustion"—claiming that Monsanto's rights extended only to the first generation of seeds. The High Court roundly rejected the argument, with Justice Elena Kagan writing:

> *Under the patent exhaustion doctrine, Bowman could resell the patented soybeans he purchased from the grain elevator; so too he could consume the beans himself or feed them to his animals. But the exhaustion doctrine does not enable Bowman to make additional patented soybeans without Monsanto's permission.*

The ruling was criticized by anti-GMO groups, including Food Democracy Now. Executive director and founder Dave Murphy called it a major loss for U.S. farmers and consumers:

The Court's decision to give Monsanto the power to control the future harvest of America's family farmers and our county's food supply is deeply troubling, immoral and a very bad sign for the future of our nation's food.

GMO seed patents are targeted, in part, because they represent some of the world's largest cash crops, including corn, soybeans and cotton, and have come to symbolize "industrial" and "intensive" agriculture in the eyes of critics. Blogs like this one in Alternet advance the meme that "for as long as humans have been growing food, farmers have saved seeds from their harvest to sow the following year." The meme, and it's a familiar one in anti-GMO circles, goes on to accuse large agricultural companies of fundamentally upsetting farming traditions by developing unique crop varieties and receiving patent protection to prevent farmers from saving the seeds they purchased. Some critics even imply companies have developed "terminator" seeds—sterile seeds designed so they can't grow again, Terminator seeds do not exist.

These arguments are advanced by the most high profile anti-patent critic, Vandana Shiva, a philosopher and environmental activist from India. Shiva also blames GMO technology, and the laws that protect it, for the high rates of farmer suicides seen in some parts of India. She argues that farmers face severe financial challenges as a result of having to repurchase seeds each year:

> *Patents on seed are illegitimate because putting a toxic gene into a plant cell is not "creating" or "inventing" a plant. These are seeds of deception the deception that Monsanto is the creator of seeds and life; the deception that while Monsanto sues farmers and traps them in debt, it pretends to be working for farmers' welfare, and the deception that GMOs feed the world. GMOs are failing to control pests and weeds, and have instead led to the emergence of superpests and superweeds.*

The unfortunate situation faced by farmers in that nation is complex. Numerous independent studies have shown no link between a 30-year suicide epidemic and GMO cotton, introduced into India in 2003 (read GMO FAQ). Considerable research points to a range of causes, including a poor agriculture infrastructure, the use of non-traditional credit sources and crushing debt for farmers with little in the way of a safety net following periodic crop failures.

The fact is few farmers, even in developing nations, prefer to save seeds. Hybrid and GMO seeds dramatically outperform non-patented seeds, and often require fewer inputs fertilizers and crop protection chemicals. Their higher upfront costs are more than made up for at the point of sale. Farmers are business people; if patented seeds were not worth the higher cost, they could switch to non-patented alternatives. Nor do cost-conscious farmers want to save patented seeds, despite their high costs. Succeeding generations of hybrid or GMO seeds lose their trait surety. The seeds are less reliable and the trait degrades with each generation, as farmer Amanda Zaluckvi explains:

> *Without getting too deep in genetic science here, suffice to say that the second generation of plants do not always exhibit the beneficial traits the hybrids were bred to exhibit. If you're familiar with how genetic traits are passed from one generation to the next, including a general knowledge of dominant and*

recessive genes, you'll understand that only a certain percentage of the second-generation plants will exhibit the qualities that made the hybrid variety so special.

Source: University of Arkansas

Farmers, even in developing countries, cannot afford to take the risk of diminished yields.

This argument is bolstered by the fact that there is now an off-patent version of Roundup-Ready soybeans, developed by the University of Arkansas after Monsanto's initial patent expired in 2015. Farmers are free to plant, save and re-plant seeds from the resulting crop for future years. Demand for the seeds, however, has been modest, with the vast majority of farmers opting to pay more for the newest generations of seeds, dubbed Roundup Ready 2.

There is one element of patent protection that has drawn the criticism even from supporters of GMO technology. The patents can be used to prohibit outside scientific research into the plants. This issue surfaced nationally in 2009, when a group of corn scientists accused biotech companies of standing in the way of research by limiting access to patented seeds. In a statement to the Environmental Protection Agency, they said that because of those policies: "No truly independent research can be legally conducted on many critical questions."

That issue has since been largely resolved. Monsanto and others now offer research licenses to researchers at more than 100 U.S. universities.