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Who controls the future of our food?

Agricultural companies are patenting seeds – and thereby privatizing the basis of our food. New genetic engineering will reinforce this trend.

By Raluca Besliu, Katharina Wecker (text) and Bruce Eesly (pictures), 04.10.2024

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Broccoli is just broccoli until you take a closer look at its origins. For example, in the fields of the Sativa breeding company in Rheinau, Canton Zurich.

This is where sprouted broccoli is grown, which farmers sow in the fall and harvest in the spring. To do this, it must withstand cold and snow and survive with little sunlight, meaning it must be particularly "winter hardy."

Breeding a winter-hardy variety is a laborious process: breeders have to cross two different varieties. They select the most winter-hardy of the offspring and cross them with other varieties. This takes several years.

The more different varieties the breeders can use, the better the broccoli becomes. They order seeds from other breeders in Great Britain, the USA and Japan, and ask gene banks. All seeds are freely available to them, including those from competitors. This is regulated by the international plant variety protection law, which Switzerland also follows. Because everyone should benefit from breeding progress.

There was only one type of broccoli that the breeders at Sativa were not allowed to use: the purple Broccoli Burgundy. This was patented. The Dutch seed company Bejo had it protected for its anti-cancer substances.

"We would have liked to use the variety because it is winter hardy. We were not interested in the anti-cancer substance," says Paul Gruner, breeder at Sativa. "But we cannot risk a patent dispute, that would be too expensive. So we did not crossbreed it."

This is where the problem begins. The problem with patents.

In 1888, the Federal Institute of Intellectual Property granted Switzerland's very first patent to Paul Perret for the invention of a watch movement. Today, the Institute grants thousands of patents every year to encourage innovation.

A patent holder benefits solely from her invention for up to 20 years because anyone who wants to use the invention has to pay a royalty fee. In return, however, she has to disclose the details of her invention so that everyone can build on the invention.

But when it comes to seeds, this way of promoting innovation has its limits.

This is shown by discussions that the Republic has had with small and medium-sized breeders in Switzerland, Germany and the Netherlands. They all said the same thing when it came to patents: legal uncertainty. High costs. Less variety. Big versus small.

Europe has one of the most diverse seed industries in the world. In addition to the agricultural giants Bayer, Syngenta and BASF, there are hundreds of small and medium-sized breeders. They grow vegetables and grains for local needs: the soil in Rheinau is different from that in Rotterdam, the climate in Hamburg is wetter than that in Marseille. And they concentrate on varieties that are of no interest to the big companies because of the low profit margins.

But plant patents threaten this diversity of companies. If the number of patents increases, breeders fear the end of free seed breeding and a situation like in the USA, where four companies control almost the entire market.

tomato breeding blocked

Visiting Frans Carree in the Dutch province of Gelderland: He works for the medium-sized organic seed grower De Bolster, which is known for its tomatoes.

Carree puts on a white protective suit. Only then does he open the door to the greenhouse and close it again immediately. Under no circumstances can he bring germs in. Especially not the highly contagious Jordan virus, which has been slowly spreading around the world since 2014 and can destroy entire harvests.

In Israel, where the virus went unnoticed for a long time, tomato production shrank by half between 2014 and 2021. In Switzerland, people are therefore extremely cautious: in 2022, the state research institute Agroscope had around 6,000 infected young tomato plants destroyed at Zurich Airport.

In Frans Carree's greenhouse, hundreds of ropes are stretched between the ceiling and the floor, and tomato plants climb up them. Some are small and bushy, others are several meters high.

Between the aisles there are cups with electric toothbrushes, but without toothbrush heads. "We use them for pollination," says Carree. "There are more professional tools, but they are much more expensive." The electric toothbrush imitates the vibration of bees and bumblebees beating their wings against the flowers. Carree catches the pollen that falls down and uses it to pollinate another plant.

After the harvest, Carree and his colleagues evaluate the tomato plants in terms of growth and color of the leaves as well as the number, size, shape and taste of the fruit. The most promising 20 percent go into the next round. The growers continue to work with them. The rest are discarded.

Carree looks over the tomato bushes. Although everything is growing and thriving, he sees the decay. His tomato breeding is blocked by patents.

The reason for this is the dreaded Jordan virus. If Carree's tomatoes are not resistant to it, no farmer will buy them, no matter how beautiful, delicious and productive they may be. Pesticides or other aids are no help against viruses. The tomatoes must be resistant.







To the pictures With the work " New Farmer " (2023), Berlin artist Bruce Eesly questions the dominant narrative of the post-war agricultural revolution. Using AI-generated images, he blurs fact and fiction and explores our relationship with nature as a source of food and resource, but also the way in which stories are shaped and perceived through images.

"New Farmer" seems to tell the success story of the Green Revolution: genetic manipulation leads to new types of plants that produce bigger and better harvests. Motorization, pesticides and artificial fertilizers also increase productivity. However, cracks appear as the story progresses; the images hover just beyond credibility until they finally tip into the absurd. These are not documentary photos from the 1960s, as one might think at first glance, but images recreated from that era by artificial intelligence. This alternative version does not end in the huge fields of monocultures that surround us today, but instea produces oversized vegetables.

With humor, “New Farmer” questions the common narrative of the Green Revolution and challenges viewers to take a critical look at our place in the biosphere and the impacts of our actions.

Breeders around the world are therefore working on varieties that are resistant to the Jordan virus, and the big companies seem to be winning the race. More than 20 patent applications have been filed with the European Patent Office by companies such as BASF, Bayer and Syngenta.

Although the patents have not yet been approved, they are already having an impact on free breeding: it will take eight to ten years for Carree to develop a new resistant tomato. By then, the patent office will have approved some or perhaps all of the agricultural giants' patents. Then his variety could possibly be affected by one of them, or in the worst case, by several. He would have to pay license fees, which would eat into his profit margin.

In 2017, the European Patent Convention was amended . Since then, patents no longer apply to plants produced using biological means. If Carree finds a resistance through conventional breeding that is similar to the patented resistance, he would not have to pay any license fees. But what was introduced as protection for conventional plant breeders leads to considerable problems in practice.

Carree could be sued at any time. He would have to hire a lawyer and prove that he did not use a patented tomato variety. To prevent this from happening, he spends a lot of time researching. He definitely doesn't want to accidentally infringe a patent.

"It takes so much time to fight against patents. I do all this alongside my actual work. I'm a breeder, I like being with my plants," says Carree.

He does not yet know how he will deal with the problem or whether he will continue with his tomato breeding.

More patents through new genetic engineering

There is also a lot of discussion about patents on seeds in the EU at the moment. The reason for this is planned relaxations for the use of genetic engineering in agriculture: At the beginning of the year, the EU Parliament voted in favor of a proposal from the EU Commission: plants created using new genetic engineering methods should be easier to bring onto the market in the future.

In Switzerland, a similar proposal for new authorisation procedures is being worked on, which is to be based on the proposal of the EU Commission. Since the end of 2005, a ban on the cultivation of genetically modified organisms has been in place following a referendum. The ban has been extended several times since then , most recently until the end of 2025.

The new genetic engineering involves processes that allow scientists to work much more precisely. They can switch off individual genes or insert new genes at a defined location. This level of precision is not possible with traditional genetic engineering. In

this case, bacteria are used, for example, to transfer the genes. Where the new genes end up in the genome and how many copies are inserted is a matter of chance.

This is why the new genetic engineering is also called genome editing, because it allows the genome - the genetic material - to be edited in a targeted manner. In simple terms, you can imagine it as a text editor that can delete, rewrite and change. The most famous of these methods is the gene scissors CRISPR.

To date, the old genetic engineering law also applies to these new methods, with strict testing of possible risks to the environment and health as well as labeling requirements. Only one genetically modified plant may be grown in the EU, a type of corn. But around 100 such plants may be imported into the EU and marketed as food and feed.

Since the new genetic engineering is precise and no genes from other organisms are inserted into the plants, new rules for the new genetic engineering in agriculture are now needed. The EU Commission proposes that because it is not possible to distinguish whether a plant has been genetically modified or whether it has been bred using conventional methods, the EU should not regulate such plants.

Specifically, the EU wants to work with two categories for new genetic engineering. If new varieties contain fewer than 20 genetic modifications, they should be treated like conventionally bred plants. This means that they do not fall under the strict genetic engineering law. For plants with more than 20 genetic modifications, however, stricter regulations should continue to apply.

The law has not yet been passed. One of the issues at issue is patents. With relaxed rules, gene scissors are likely to be used much more frequently in the future. An overview study by the European Commission expects that innovations will increase , and with it the number of patents.

As soon as genetic engineering is used in the development of a new variety, it is considered a technical invention and therefore patentable. In 2023, agricultural giants have already registered around 230 patents on plants that have been bred using new genetic engineering. This is stated in a report by the No Patents on Seeds initiative, which the Republic has had access to. The companies are already registering the patents in anticipation that the EU will soon deregulate the new genetic engineering.

As part of the relaxation of restrictions, members of the European Parliament are therefore calling for a complete ban on patents on plants created using new genetic engineering methods.

But plant breeders should not be too quick to celebrate the proposed ban, warns EU parliamentarian Martin Häusling. Because: "The parliamentary decision is worthless," he says. Häusling is a member of the Green Party and is responsible for the proposed

law within the party. "The decision creates the illusion that the issue can be regulated by the European Union not allowing patents."

However, the final word on patents on plants does not lie with the EU, but with the little-known European Patent Office. Contrary to what its name suggests, it is not an EU institution. In addition to the EU countries, countries such as Switzerland, Turkey and the United Kingdom are also members, making a total of 39 nations. The office is financed solely through patent fees.

In order to ban patents on plants, all 39 member states would have to unanimously change the European Patent Convention, which is essentially their constitution.

"I don't see that the member states want to change the procedure as a whole," says Häusling. Spain, Denmark and the United Kingdom are considered to be great advocates of the patent system.

Double win

Another point of contention regarding new genetic engineering is the hopes and promises that are placed in it. Proponents of genetic engineering see great potential in it : fewer pesticides, less water required, resistance to diseases, better resilience to droughts.

All major seed companies also emphasize the advantages of the new genetic engineering. BASF wrote in response to a request from the Republic that the company wants to create "solutions for more sustainable agriculture," and the seed manufacturer KWS wants to ensure that the "new varieties are adapted to climate change."

Former Syngenta CEO Erik Fyrwald even said that feeding the world's population would not be possible without genetic engineering . A Syngenta spokesman toned down the theatrics in a written statement to the Republic, saying that "new genetic engineering is not expected to solve all of farmers' problems" but should be viewed as a "complementary tool."





Even smaller companies such as the potato breeder Solana or the grain breeder Streng-Engelen in Germany are very positive about the new genetic engineering because it can speed up breeding and help everyone in technical terms. Even

the Swiss Bioland pioneer Urs Niggli sees great potential in genome editing to breed resistant varieties and save on pesticides.

But will the agricultural giants keep their promises? Will they breed climate-resistant seeds?

It is worth taking a look at the patent applications that have been submitted to the European Patent Office. They are about bananas that do not turn brown so quickly, about rapeseed that is to be made resistant to the widespread disease stem rot, about corn that is easier to digest. But there is also the issue of herbicide-resistant plants. These were already popular with the old genetic engineering.

When the first genetically modified plants came onto the market in the USA in the 1990s, they were mainly seeds that were sold together with suitable weed killers. The best-known example is Monsanto's Roundup Ready soybean, which is resistant to the glyphosate-containing weed killer Roundup.

This combination of seed and herbicide is still popular among agricultural giants today, says Jennifer Clapp, who researches the rise of mega-corporations in agriculture and the food industry at the University of Waterloo in Canada.

About 90 percent of the genetically modified crops grown worldwide are herbicide tolerant, says Clapp. "Although companies emphasize that genetic engineering is essential for adapting to climate change, in practice only a very small percentage of commercial genetically modified crops are bred for drought and heat tolerance," says Clapp.

The emphasis is on “commercial”. Universities and public institutes are increasingly researching climate-resistant plants.

With the focus on genetically modified plants, the number of patents in the USA is also increasing. With devastating consequences for the once diverse seed industry. As companies like Monsanto and Dupont grew, they took over small breeders, swallowed them up or even closed them down.

More than 200 small to medium-sized breeding companies disappeared in the 1990s and 2000s, reports the United States Department of Agriculture . Today, just four companies own 97 percent of all patents on canola, 95 percent of all patents on corn, and 84 percent of all patents on soybeans.

In Europe, we are still a long way from the situation in the USA. But the seed industry is already changing here too. There is a clear trend towards patenting and commercialization. And towards secrecy, says plant breeder Paul Gruner in Rheinau.

"The cooperation between breeders is very collegial," he says. "We help each other. But things are changing. Many breeders used to happily talk about their results, but now

they are not allowed to say anything at conferences. They all have to sign a confidentiality agreement. Everything is controlled by the company's internal legal departments wherever possible."

The State as Breeder

For the agricultural giants, there is no alternative to patents. Billions of euros are at stake. Bayer says it invests over two billion euros annually in research and development of plants. Without patents, "no company would invest," wrote a Bayer spokesman in response to a query from the Republic.

In response to the growing criticism of patents from traditional breeders and environmental organizations, Bayer, together with Syngenta, BASF and other companies, has founded a licensing platform. Members can breed with patented material free of charge and can manage licensing fees via the platform. This is intended to facilitate access to patented material.

But the offer does not solve the basic problem of patents: costs for traditional breeders are rising. Important genetic material is being taken from the common, freely available gene pool because breeders are no longer allowed to use every plant. The diversity of seeds is decreasing.

The big solution idea is missing.

Switzerland is at least making some adjustments. It should soon be easier for breeders to keep track of patents. Up until now, this has not been so easy. Variety names rarely appear in patent documents.

That is why breeders should be able to use an online platform to inquire whether a particular plant variety is patented. If the patent holders do not respond within 90 days, breeders can assume that the variety is freely available. Patent claims expire. That is the idea. Breeders, multinational agricultural companies and other interest groups were able to comment on the Federal Council's proposal via the planned platform until mid-September.







Christian Ochsenbein from the breeding company Delley Seeds and Plants on Lake Neuchâtel believes that the state has a responsibility to prevent the market power of a few large companies. Not by regulating patents or new genetic engineering, but by breeding itself.

Methods such as genetic scissors are expensive and complicated. Smaller breeders in particular lack the know-how. The state research institute Agroscope is already breeding disease-resistant varieties, also in cooperation with private companies such as Delley Samen und Pflanzen.

Ochsenbein hopes that Agroscope will be more involved in the early development phase of new varieties in the future. For example, with the help of new genetic engineering, it could introduce resistance genes from wild varieties into cultivated varieties and then make these available to breeders for cross-breeding. "We small breeders cannot afford that," says Ochsenbein. The state can then decide for itself how much it wants to charge in license fees.

In general, Ochsenbein is relaxed about the patent problem. Why is he not as worried as his colleagues? "It may well be that I have not been affected enough so far and therefore do not see any danger," he says. Ochsenbein mainly breeds grain. It usually takes 15 years for a new variety to be ready for the market. "By then, patents are already approaching their expiration date; they are valid for 20 years," he says.

The breeding period for vegetables is shorter. They are then potentially affected by patents for several years. It took seven years to breed sprouted broccoli with Sativa, from the first cross to the point at which farmers and hobby gardeners could buy the seeds.

For broccoli breeder Paul Gruner, the solution to the patent problem is obvious. "The simplest thing would be to stipulate that crossing varieties does not infringe patents," he says. Patent fees should then only be charged if you buy the patented variety and grow it. "The issue is too important to make a commercial out of it."

About the authors

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