EXPOSED

How biotech giants use patents and new GMOs to control the future of food

GLOBAL 2000

Friends of the Earth Europe

Corporate Europe Observatory

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IG Saatgut
Interessengemeinschaft für gentechnikfreie Saatgutarbeit

AK WIEN

Published by GLOBAL 2000 – Friends of the Earth Austria, Friends of the Earth Europe, Corporate Europe Observatory (CEO), Arche Noah, IG Saatgut – Interessengemeinschaft für gentechnikfreie Saatgutarbeit and Arbeiterkammer Wien.

October 2022

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INTRODUCTION

The last two decades have seen a boom in applications for patents on plant breeding techniques and their products, both in Europe and globally, restricting access to seeds and crops for plant breeders and for farmers. Many of the patents are linked to techniques which are used for genetic modification, with biotech giants Corteva and Bayer behind many of the applications. This report looks at the patenting process against the backdrop of proposed changes to GM (genetically modified) regulations in the European Union (EU) for new GM techniques (known as new genomic techniques or NGTs). It explores the implications for farmers, plant breeders and the wider food chain, and calls for a new approach to protecting genetic diversity and ensuring agricultural resilience.

1 ARTIFICIAL MONOPOLIES AND THE PRIVATISATION OF LIFE

What are patents?

Patents are intellectual property rights which are granted by public authorities for technical inventions. They were originally intended to boost industrial innovation, and they provide exclusive rights to the titleholders as to how their inventions are used, effectively creating **artificial monopoly rights**. This intervention in the market is intended to trigger more investment in research and development. Today these powerful legal tools are increasingly also being used by companies seeking to dominate seed markets by restricting their competitors' access[1].

> Patents are artificial monopoly rights which were originally intended to boost innovation in technical domains. They are increasingly used strategically as bargaining chips by companies against their competitors, essentially hindering innovation.

Patenting life?

Patenting life forms has been highly contested from the outset, with critics arguing that life forms cannot and should not be regarded as a human invention that can be owned or controlled. However, biotech and pharmaceutical corporations lobbied heavily for patents, in order to increase their control over seeds and medicines.

The first case in the United States was in 1980 when a patent was granted for an oil-eating bacterium. In the European Union (EU), the first attempt to change patent law to allow patents on life was in 1996, which was also the year that the first genetically modified (GM) soy shipments arrived in Europe. This attempt was defeated by the European Parliament, who considered patents on life were unacceptable. The biotech industry launched one of the biggest lobbying battles of that time, claiming that if patents on life were not granted, cures would not be developed for chronically ill patients. MEPs finally accepted the biotech-directive[2], allowing patents on agricultural crops as well.

1 Knut Blind, Katrin Cremers, Elisabeth Mueller, "The influence of strategic patenting on companies' patent portfolios", Research Policy, Volume 38, Issue 2, 2009, Pages 428-436.
2 Directive 98/44/EC of the European Parliament and of the Council of 6 July 1998 on the legal protection of biotechnological inventions

How are patents granted in Europe?

Patents are generally granted by national patent offices, but in Europe, patents are also granted by the European Patent Office ("EPO") on the basis of the European Patent Convention ("EPC") adopted in 1973 and the updated Implementing Regulations (including EU Directive 98/44 which outlines what is patentable in terms of life forms). Patent applications can also be made through the World Intellectual Property Organisation (WIPO), and are then examined by the EPO or by relevant national patent offices[3].

To receive patent protection, inventors need to show that what they have developed is new (i.e., it has not been patented or disclosed before), inventive (i.e., it cannot be an obvious method or application for persons knowledgeable in the field of application), and can be produced or used in an industry. Enough details about the invention need to be disclosed to allow replication, and to enhance knowledge in the field of application.

Patents can be opposed after they have been granted, leading to costly and often technical legal proceedings involving specialist lawyers to determine whether the patent fulfils the criteria for patentability or disclosure. Although anyone can launch a case, the costs and the waiting time for a hearing are an effective barrier to taking action.

Patent monopoly rights

Once granted, patents give **powerful exclusive rights to inventors for a limited time-period**, usually 20 years. Applications include **patent claims** which set out the processes or products covered by the patent. In practice these claims determine the reach of the patent and the extent of the monopoly rights. Other actors must gain the permission of the patent holder to use the patented process and/or product, which is usually only granted in exchange for the payment of licence fees.

Patent claims are often extremely broad, especially for biotechnology patents. As a result, these claims can significantly impact opportunities for further innovation by others, effectively limiting innovation and undermining the original purpose of the patent system to promote innovation.

> The extent of the monopoly rights granted by patents is determined by the law, but in effect also by the wording of the claims made by applicants in their patent application.

Patentability of biotechnological inventions

Patents relating to life sciences have always been contentious especially because of ethical questions related to concerns about the appropriation of nature. Patents on genetically modified plants are particularly contentious. From 1999 until the end of 2020, nearly 4000 European patents were granted, mostly for genetically modified plants[4].

European laws dictate that patents cannot be granted for so-called "essentially biological processes" and their resulting products. The Directive 98/44 also states that a single plant or animal variety cannot be patented, but inventions that can be applied to more than one variety are patentable. That means that when biotechnology patents claim a specific genetic sequence or trait found in a number of plant varieties, those varieties cannot be used by breeders or by farmers without a licensing agreement (and fees) with the patent owner. This has resulted in lengthy legal battles between different players in the seed industry[5].

Despite the exemption from patentability for plants obtained by "essentially biological processes" in EU law, the biotech giants are still (often successfully) applying for patents on plants obtained by conventional breeding. The organisation "No Patents on Seeds!" is working to close the legal loopholes that allow such patents to be granted in conflict with EU law.

Patents on life are very different from patents on machines or chemicals for example, as the monopolies can and do extend in practice to the offspring of plants or technical processes, and the same 'invention' can also be found in nature, without requiring genetic engineering.

This is significant, as agricultural biotechnology, and especially plant development, often rely on incremental

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3 In the future EU Unitary Patent System, the scope of protection awarded will not depend on national laws, but rather on EU law, see https://ec.europa.eu/growth/industry/strategy/intellectual-property/patent-protection-eu/unitary-patent_en

4 Christoph Then, Andreas Bauer-Panskus and Ruth Tippe, "New GE and food plants: the disruptive impacts of patents on breeders, food production and society", Testbiotech, June 2021 (https://www.testbiotech.org/en/content/new-ge-and-food-plants-disruptive-impact-patents-breeders-food-production-and-society)

5 Michael Blakeney, "Patenting of Plant Varieties and Plant Breeding Methods", Journal of Experimental Botany, 2012, and Michael Kock, "Patenting non-transgenic plants in the EU", Research handbook on intellectual property and the life sciences, Chapter 8, 2017, pp. 132-159.

progress, building on existing biological material and related products. Traditionally, intellectual property has been granted by national plant variety offices through "plant variety protection" or "plant breeders' rights" based on national laws.

Plant variety protection (PVP) rules, like patents, largely prevent farmers in the Western world from saving any of their own seeds without paying royalties to seed companies. But the titleholder's exclusive rights to the plant variety are more limited than patent rights.

Because patents can be granted on technical processes and products that are not limited to a single plant variety, hundreds if not thousands of plant varieties can fall under the scope of a patent.

In agricultural plant biotechnology, patents have been contested due to ethical concerns on the ownership of life, and the incremental nature of plant breeding innovation. Recourse to patents has steadily increased with the advent of genetic engineering techniques, considerably changing the rules of plant innovation.

2 PATENTS ON NEW GMOS

This section looks at patent applications for NEW techniques used for genetic modification, often referred to as genome editing, like CRISPR-Cas.

Which GM processes and products have been patented?

The development of new techniques for genetic modification, such as Crispr, has led to an increase in patenting applications in agricultural plant biotechnology. The WIPO's Patentscope, which covers 103 patent jurisdictions worldwide (including all patent applications granted, rejected, or lapsed), identifies 20,081 patents that reference "Crispr-Cas9 plant"[6] (Sept 2022).The same search in "The Lens", a comprehensive patent and scholar knowledge mapping tool developed by the non-profit CAMBIA identifies 3,600 records for European patents. Espacenet, the database run by the European Patent Office lists 690 patent applications for Crispr-Cas9 and plants (including those that have been granted or rejected).

Patents are generally divided into two categories:

a. process patents relate to an inventive process to produce products, such as the modification techniques used for new GMOs. Anyone who wants to use the patented process needs to have the consent of the titleholder, paying license fees for the use of the invention, and usually also royalties on the sales of the product developed using the patented processes.

b. product patents relate to an inventive product, such as an altered DNA sequence that introduces certain characteristics to a plant in a crop species, increasing the starch content of potatoes for example. Anyone who wants to use or commercialise the product, or develop the same product using a different process, would need to have the consent of the titleholder and pay royalties.

6 This is done to exclude all pharmaceutical applications of the technology.

Product patents can restrict competition more than process patents as they extend beyond the explicit use of the patented invention, covering products with the same characteristics, even though they may have been obtained through a different, potentially equally inventive process[7].

Patents for the use of a technical process to develop a product with specific technical properties (such as the use of Crispr-Cas9 to increase starch content in potatoes) often include **product-by-process claims** which means that the monopoly of process patents (biotechnology tools) extends to the resulting products (plants and their characteristics). Anyone in the value chain who wants to use the plant or its characteristics must ask for consent and pay royalties, even if they have not used the patented process directly.

As there is no easily accessible information on what is included in the patents, it can be difficult to know which plants are patented. Breeders, farmers, and others in the food chain (such as manufacturers) can face significant legal uncertainty as to what they can or cannot do with the plants they work with on a daily basis. This legal uncertainty disproportionally affects small and medium-sized plant breeders and processors, who do not have the legal teams to support them, or the resources to carry out their own sequencing. This is yet another factor making it increasingly difficult for small seed companies to survive, leading to a further concentration of the seed industry.

In agriculture, process patents can protect an innovative process to develop a plant variety, such as a breeding or transformation method. Product patents can protect the plants themselves, and/or DNA sequences identified as giving the plants certain identified characteristics. In practice, process patents can also cover products such as plants or cells, through product-by-process claims.

Examples of patents on GM techniques

While the number and nature of patents is constantly evolving, most patents for GM techniques are currently granted for processes, but include claims which extend to products obtained from the patented processes.

For example, Corteva holds the patent EP 2893023 (originally granted to Dow, also now part of Corteva), which primarily concerns a method for modifying the genome of a cell using nucleases and the Crispr technique. In this case, one of the patent claims also covers all cells, seeds and plants that include the same introduced genetic sequence (i.e. not native) from a long list of crop species ranging from broccoli to maize, soybean, rice, wheat, cotton, barley, and sunflower.

In terms of new GMOs, it is almost impossible to know exactly what has been patented, because the technology is quite new and applications are often described in deliberately broad terms, so giving broader protection. According to experts “many patent applications will speculate as to using NGTs [new genomic techniques] to alter desired plant traits, without actually having necessarily done so”[8].

For example, Corteva’s patent EP3191595 on gene scissor applications in corn and soybean species states that “the double-strand-break target site can be, but is not limited to, a target site for a zinc finger endonuclease, an engineered endonuclease, a meganuclease, a TALENs and/or a Cas endonuclease”. This means that any of these techniques could have been used, and that other breeders may be in breach of the patent when they use any of these techniques.

Some recent patent claims also combine old and new genetic modification techniques[9] with more traditional breeding, crossing and selection techniques, providing protection to an even wider range of processes. Research from the international alliance „No patents on seeds“ revealed seed corporations deliberately blur the distinction between conventional breeding and random mutagenesis on the one hand, and genetic engineering on the other hand.

7 The produced plants will not necessarily be identical themselves, as the GM techniques used will bring about specific changes in them, but the characteristics that have been patented can be found in plants developed using other methods, whether through conventional breeding or farmer selection, which rely on crossing and selecting the most interesting or adapted plants.

8 Abby Meyer and Sara Dastgheib-Vinarov, “The Future of Food: CRISPR-Edited Agriculture”, available at https://www.fdli.org/2021/11/the-future-of-food-crispr-edited-agriculture/#:~:text=II.%20What%20Is%20CRISPR (accessed May 2022)

9 Ruth Tippe, Johanna Eckhardt & Christoph Then, “Stop patents on our food plants!”, No Patents on Seeds, March 2021 https://www.no-patents-on-seeds.org/sites/default/files/news/Stop%20patents%20on%20our%20food%20plants%20(2021)_1.pdf - p.14

For many of these patent applications, it is unclear whether genetic engineering is needed to achieve the desired traits. But companies are thought to be including a reference to genetic modification to ensure that the process is eligible for a patent. Genetic changes that can be achieved through natural breeding techniques are not eligible for patenting according to the law. Even so, corporations have tried[10], but finally without success.

This increased use of patents, in combination with genetic modifications, is likely to result in a significant increase in the number of seeds and food with properties that are covered by a patent. This reduces access to biological diversity for plant breeders and farmers, and creates legal uncertainties around the use of seeds.

Who are the dominant players?

Impressive patent wars have been (and are still) fought by research institutes over the foundational patents of new GM techniques, but most licensing rights (for agricultural uses) and crop-specific patents are held by large biotechnology firms, with Corteva (former Dow-Dupont-Pioneer) taking a leadership position, through its own patents and extensive licenses.

The battle to claim ownership and so control of the **foundational technology** behind the new GM techniques, in particular Crispr-Cas9, has been fought bitterly between research institutes[11]. The Broad Institute won a recent victory, with a ruling on key patent rights in the US, but the University of California (and Caribou Biosciences) team who received the Nobel Prize for Chemistry is expected to continue its challenge[12].

> Important patent wars surround the identification of ownership and control of foundational new GM technologies, especially Crispr-Cas9, opposing universities across the globe.

These foundational patents concern the general principles of the technique itself, whether used in the biomedical field or in agricultural plant and animal biotechnology. These patents are of key interest to the big biotech multinationals including Corteva (integrating Dow, Dupont, and Pioneer) and Bayer (which has recently acquired Monsanto).

Research conducted by TESTBIOTECH on WIPO **patent applications** concerning new GM techniques such as Crispr-Cas, TALENs, zinc finger and meganucleases between 2016 and 2020 showed Corteva to be leading the race to acquire patents, followed by Bayer[13]. Out of the 10,350 patents found in the WIPO Patentscope, Pioneer (Corteva) applied for 1430 patents, MIT is named in 432 applications, the Broad Institute (based at MIT) in 411, and Monsanto (Bayer) in 119 applications[14].

These companies have also entered into **licensing agreements** with various research institutions for the use of foundational GM techniques. Corteva had alliances with both the University of Vilnius, and with Caribou Sciences, a University of California spin-off, as early as 2016 when they were flagged as a "Crispr-Cas patent land grab"[15].

Corteva, Bayer (then Monsanto), Syngenta, BASF and Arcadia Biosciences have all secured licenses to the Broad Institute's patents[16]. Corteva has also sub-licensed the technology to a number of public research institutes, including global gene banks and plant breeding institutes such as CIMMYT (international maize and wheat improvement centre), and IRRI (International Rice Research Institute).

A large-scale mapping of the innovation landscape around the Crispr-Cas9 technology shows Corteva has used its licences for the technology to develop it for agricultural use.

Corteva has also acquired the majority of rights to ZFN technology via Dow Agrisciences, while licensing rights to the patents for TALENS are owned by Bayer/Monsanto, Corteva and Calyxt[17]. The dominance of these companies exacerbates issues over access to the new GM technologies[18].

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10 Ruth Tippe, Johanna Eckhardt & Christoph Then, "Stop patents on our food plants!" No Patents on Seeds, March 2021 https://www.no-patents-on-seeds.org/sites/default/files/news/Stop%20patents%20on%20our%20food%20plants%20(2021)_1.pdf
11 Jacob S. Sherkow, "The CRISPR patent landscape: past, present and future", The CRISPR Journal, Feb 2018, pp. 5-9 (available at 10.1089/crispr.2017.0013)
12 Heidi Ledford, "Major Crispr patent decision will not end tangled dispute", Nature 603, 373-374 (2022) 11
13 Christoph Then et al, op. cit., p.11.
14 Numbers from the WIPO database search.
15 Grushkin, Daniel. „DuPont in CRISPR-Cas patent land grab." Nature Biotechnology, vol. 34, no. 1, Jan. 2016, p. 13.
16 Jefferson, O.A., Lang, S., Williams, K. et al. Mapping CRISPR-Cas9 public and commercial innovation using The Lens institutional toolkit. Transgenic Res 30, 585–599 (2021); https://doi.org/10.1007/s11248-021-00237-y
17 IHS Markit Agrow, "Game changers: gene-editing technologies and their applications 2020", p.13, available at: https://cdn.ihsmarkit.com/www/pdf/0320/202002-GeneEditingTech-Agrow-LD-Sample-Version001-pdf.pdf (accessed May 2022)
18 Ibidem

Applications of new GM technology in agriculture are controlled by large biotech multinationals, both through direct patent applications, and through licensing agreements. Corteva (regrouping Dow, Dupont and Pioneer) and Bayer (notably through its acquisition of Monsanto) are the leading players.

The Broad Institute's latest victory over foundational Crispr patents may mean Bayer is catching up with Corteva on rights to Crispr-Cas9 applications in agricultural plant biotechnology, but it will not change the dependency of others on both companies.

While the costs of single licenses are commercially guarded secrets, market research foresight exercises have flagged that the technology and trait licensing segment of the agricultural gene-editing technology market was worth a whopping 193 million USD worldwide in 2020[19].

And this estimate does not include potential additional royalty payments that might accrue down the food chain.

Hidden patents

Knowing a company's GM patent portfolio does not reveal whether the patented inventions have been used or are found in any of the company's plant varieties – and companies are not required to declare which marketed products have been developed using the patented invention. This means there is no way of tracing use of the invention.

Nor do patentability criteria include any requirement that the invention must be detectable. However, in the interests of enforcement, companies rely on different tactics and techniques to verify whether their inventions were used without their consent. This can include looking at competitors' catalogues, their intellectual property portfolios, and testing products that are on the market. They can also seek injunctions to access competitor's internal documents (i.e. breeding protocols) if they think a patent may have been breached.

Who is Corteva?

Corteva Agriscience was established in 2018 by DowDuPont to regroup the combined multinational's agricultural portfolio. Both Dow and DuPont were founded as chemical companies in the United States in the 19th century. While Dow commercialised insecticides from the early days, DuPont joined the market in the 1960s.

Pioneer Hi-bred was founded at the beginning of the 20th century as a seed company specialising first in corn and then in other cash crops, and became in the 1990s one of the first companies to use genomics in breeding. It also maintained close links to national political circles (US Vice-President Henry Wallace developed Pioneer's first hybrid corn).

Pioneer was purchased by DuPont in 1999, increasing the company's weight in seeds and genomics traits. Dow remained more focused on crop protection and chemistry-related markets. The merger of the two giants was cleared in 2017, but the European Commission ordered the company to divest major parts of DuPont's pesticide business. As a result, it was split into three separate companies, creating Corteva Agriscience, which combined the crop protection chemical and seed businesses of Dow Chemical and Dupont/Pioneer. In 2021, Corteva generated revenues valued at around 15,66 billion USD.

As well as dominating the patent landscape for new GM technologies, Corteva is the first company to have applied for European approval for a patented maize in which the Crispr-Cas9 technology was also used. The maize is herbicide-resistant[20].

19 IHS Markit Agrow, "Game changers: gene-editing technologies and their applications 2020", p.14, available at: https://cdn.ihsmarkit.com/www/pdf/0320/202002-GeneEditingTech-Agrow-LD-Sample-Version001-pdf.pdf (accessed May 2022)

20 Testbiotech, "First application for approval of Crispr/cas plants in the EU", https://www.testbiotech.org/node/2735 This maize is the product of a mix of old and new GE.

3 SHAPING FOOD SYSTEMS THROUGH PATENTS

What are the potential impacts of new GM patents on our food systems: for plant breeders, farmers, and others in the food chain? The absolute monopoly powers provided by patents, combined with the increasing use of patents for new genetic modification could have significant impacts on our food system, including potentially increasing food prices and in particular on the way plant breeders operate.

The growing corporate control of the genetic material that is fundamental to plant innovation through patents is likely to affect the development of plants and seeds, with significant impacts for small and medium-sized plant breeders and wider consequences for the future of our food.

Plant breeders wanting to develop new plant varieties will need to compensate the patent holder at the research & development stage, and pay royalties if the variety is commercialised.

As plant breeding is essentially a succession of crossing and selection, subsequent generations of plant varieties may contain a build-up of different product patents creating a complex web of overlapping patents held by different biotech corporations. This complexity is exacerbated by the use of "trait stacking" where a different patented traits are used together to solve different problems[21].

And because product patents are granted on plants and their characteristics, protection extends to future generations of these plants where the patented genetic trait is present. As a result, plant offspring cannot be used by other breeders, gardeners, or farmers, without the permission of the patent holder.

Because of the lack of transparency around patents, and without dedicated resources to research all the patent applications made in their field, plant breeders cannot necessarily know which plants and which characteristics are patented, creating legal uncertainty – and may only find out when they receive notification that they have violated the patent holder's rights. This could prove an existential threat to small and medium-sized breeders.

This detrimental effect of patenting, especially on plants and their characteristics, has been recognised by the plant breeding industry, which has launched the PINTO database in Europe to help breeders identify the plant varieties that fall under patent protection. However, this database, run by the plant breeders lobby association Euroseeds, is incomplete as it relies on voluntary contributions from its members.

Patents are more attractive for big corporations than the traditional PVP approach as patents provide greater protection and control of their intellectual property. It is therefore likely that they will privilege patentable varieties over others. There is a risk this could result in increasingly limited availability of non-patented, non-GMO varieties.

With a growing number of plants covered by patents, breeders will have access to a shrinking stock of genetic material, limiting their potential and restricting innovation.

This monopolisation of plants and seeds will also impact farmers, restricting what they can grow and sell, and leaving them exposed to the threat of legal action for inadvertently infringing patent rights. Patents on seeds pose a threat to all farmers, and can prevent the implementation of the right to seeds as recognised by the UN Declaration of Peasant Rights and People Living in Rural

21 Don E Kash, William Kingston, Patents in a world of complex technologies, Science and Public Policy, Volume 28, Issue 1, February 2001, Pages 11-22, https://doi.org/10.3152/147154301781781660

Areas (UNDROP) "to save, use, exchange and sell their farm-saved seed or propagating material", as well as their rights "to maintain, control, protect and develop their own seeds and traditional knowledge" in its Article 19[22].

Monsanto (now part of Bayer) became notorious for its aggressive lawsuits against farmers for allegedly breaching its patents, filing 144 patent-infringement lawsuits against farmers between 1997 and April 2010[23]. The company won numerous judgments against farmers it claimed had used its patented GM seeds without paying royalties. As a result of the threat to farmers, big farming lobby group Copa-Cogeca officially opposes patents on crops.

Restrictions on access to seeds will limit the crops that farmers can grow, impacting their ability to adapt to changing climate conditions. There have already been applications to patent lettuce seeds that have been bred to germinate at higher temperatures, and soybeans with claims of higher yields in different environmental conditions[24].

The explosion of GM patents could also exacerbate the on-going theft of biological material and related traditional knowledge, known as biopiracy (or scientific colonialism). Plants and knowledge[25] are taken and used by corporations without official approval from a country or a community, most often in the Global South where most of the world's biodiversity and knowledge is held. By using digital sequencing information, corporations can exploit a legal loophole to obtain genetic material without sharing the benefits with the country of origin. Instead of exporting the biological material itself, its DNA is sequenced and captured digitally. This loophole threatens to undermine the UN CBD Nagoya Protocol on the access and benefit sharing of genetic resources.

These problems have been recognised by the European Commission in a 2021 report on new genomic techniques in plants, which recognises that while beneficial for innovation, patents "(together with high business concentration) can also act as a barrier to market entry for SMEs and can limit access to new technologies and to genetic material, e.g. for breeders and farmers."

As patents on GMOs increasingly shape the future of plant breeding, the corporations who dominate this sector will have increasing control over the crops grown and the food we eat.

Food and beverage producers are already seeking patent claims that extend to the harvested product and the food processed, affecting bakers, brewers and other food manufacturers. Indeed, Carlsberg and Heineken have patented the barley used in the production of their beer, with the patent covering the plants, the harvest, the process for brewing, malt and wort and all drinks produced with the patented barley[26]. Such corporate control could pose a serious threat to future accessibility and availability of genetic diversity, with development focused on market control and increasing returns, at a time when there is a pressing need to innovate to address the challenges caused by climate change.

These trends, which are currently seen in patents applications for plant breeding techniques and products[27] are likely to continue as the new technology is applied to food processing[28].

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22 Christophe Golay, Fulya Batur, Practical Guide on the Right to Seeds in Europe, Geneva Academy, February 2021.
23 Organic growers lose decision in suit versus Monsanto over seeds (accessed September 2022) https://www.reuters.com/article/us-monsanto-organic-lawsuit-idUSBRE9590ZD20130610
24 Although not relying on new genomic techniques as their technical basis, Monsanto/Bayer have been granted the patent on soybeans by the EPO in 2014 https://www.no-patents-on-seeds.org/en/patent-cases/soybean, while the Dutch seed company Rijk Zwaan was granted the patent on 'hot climate lettuce' by the EPO in 2018: https://www.no-patents-on-seeds.org/en/patent-cases/salad-hot-climate
25 Biopiracy: the largely lawless plundering of Earth's genetic wealth (accessed September 2022) https://news.globallandscapesforum.org/48905/biopiracy-the-largely-lawless-plundering-of-earths-genetic-wealth/
26 Patent on barley and beer upheld European Patent Office maintains its absurd legal practice (Accessed September 2022) https://www.no-patents-on-seeds.org/en/news/barley_patent
27 No Patents on Seeds! Report on Patents on broccoli, barley and beer, 2018, https://www.no-patents-on-seeds.org/sites/default/files/2018-06/Report_No%20patents%20on%20broccoli,%20barley%20and%20beer_2018.pdf
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CONCLUSIONS

Companies are promoting the new GM technologies as natural processes that cannot be detected, and which therefore do not need to be regulated, in a campaign to exclude these new GM techniques from EU requirements for authorisation, labelling and safety checks. But the growing number of patent applications to protect these technical innovations reveals the truth.

Rather than fostering much needed innovation by increasing genetic diversity in crops, the big biotech companies, led by Corteva and Bayer are seeking to control crop development, limiting access to new technologies through the patent system and restricting the rights of plant breeders to access genetic material.

The more patents that are granted for plant breeding techniques, the less genetic diversity will be available for others to work with freely. This will not only threaten the viability of the traditional plant breeding sector, but also restrict crop development, with consequences for the resilience of our food systems which could potentially increase food prices.

To protect our food and the future of our food system

- An increasing number of patents on plants, seeds and farm animals are an abuse of patent law and put in danger the access to basic resources in agriculture and food production. Therefore, we call for an urgent close of loopholes in the European patent law in biotechnology and plant breeding and for clear regulations that exclude conventional breeding, genetic material, animals, plants and food derived thereof from patentability.
- New GM techniques create GMOs and they should be regulated as such, in line with the precautionary principle. All GMOs must undergo a strict safety evaluation and be labelled as genetically modified, to ensure transparency and traceability throughout the whole supply chain for citizens and farmers.
- More research must be carried out on the environmental, biodiversity and health risks of new GMOs, on their socio-economic impacts for farmers and the food system, and on the development of detection methods.
- European decision makers need to promote and support proven solutions for a sustainable and climate-resilient agriculture, such as agroecological practices and organic farming, and to protect the freedom of breeders to operate without being restricted by the far-reaching scope of patents on seeds produced with new GMOs.