



No patents on seeds!

End the legal chaos at the European Patent Office!
Conventional breeding must be free of patent claims.

Christoph Then, Ruth Tippe und Johanna Eckhardt
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1. Introduction: legal chaos at the European Patent Office (EPO)

In June 2017, after protests by civil society organisations and with the backing of EU institutions, the Administrative Council took a decision that patents would not be allowed on plants and animals derived from conventional breeding, or produced without using genetic engineering. However, in December 2018, the Technical Board of Appeal of the EPO decided that this decision would not be legally enforced. This means that such patents can now be granted.

The prohibition of the Administrative Council was flawed from the beginning: processes which use randomly triggered mutations were considered to be patentable inventions. Such patents could affect thousands of plant varieties because these processes have already been used in conventional breeding for more than 50 years.

Consequently, we are now faced with a legally chaotic situation at the EPO: the Administrative Council decision is neither legally enforceable nor sufficient. This situation is especially advantageous to large companies, such as Bayer (Monsanto), Syngenta and BASF, who are aiming to monopolise seeds and plants, and thereby take control of basic resources for producing our daily food. Some of these companies are even demanding that patents that were revoked are now reinstated.

In the light of this development, *No patents on seeds!* is demanding:

- End the legal chaos at the EPO!
- No further monopolisation of resources for producing our daily food!
- Keep conventional breeding free of patent claims!
- If patents are granted on processes of genetic engineering, their scope has to be confined to the specific technical processes!

2. Increasing number of patents

In essence, the basis for European patent law, the so-called European Patent Convention (EPC), excludes plants and animals from patentability. As Article 53(b) of the EPC reads, no patents should be granted on:

“European patents shall not be granted in respect of:

(b) plant or animal varieties or essentially biological processes for the production of plants or animals; this provision shall not apply to microbiological processes or the products thereof.”

However, the European Patent Office (EPO) has very often disregarded and undermined prohibitions in the EPC, and has in recent years granted thousands of patents on plants and animals. This is affecting more and more plants derived from conventional breeding.

At present, in Europe, an increasing number of patent applications are being filed on plants and animals. More than 3500 patents on plants have already been granted – most of them covering genetic engineering.

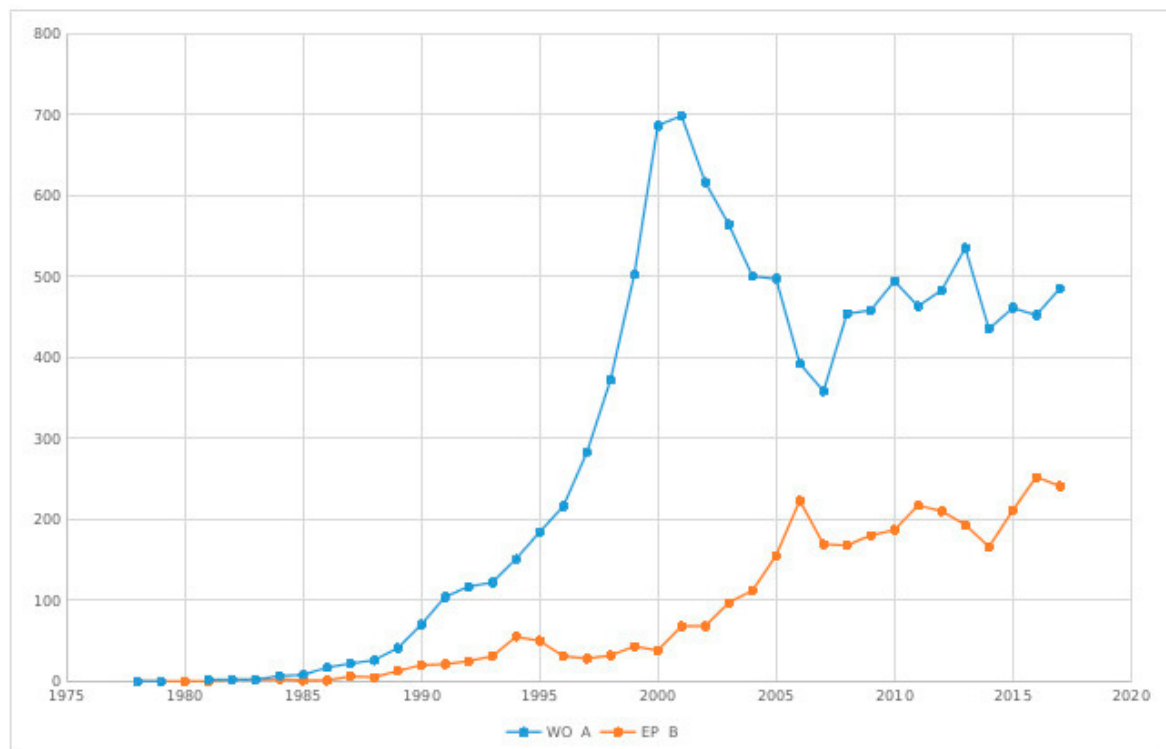


Figure 1: Patents on plants - number of patent applications on all plants under PCT/WIPO (WO A) as well as of patents on plants granted by the EPO (EP B) per year. Research according to official classifications (IPC A01H or C12N001582).

In the last 10 to 15 years, there has also been a steady increase in the number of patent applications being filed on plants derived from conventional breeding, i.e. not genetically engineered. More than 1600 such applications have been filed and around 220 patents have been granted to date.

Very often, based largely on trivial technical features, such patents actually abuse patent law, using it as a tool to misappropriate of biological resources needed for our daily food production.

Each single patent on conventionally derived traits can simultaneously impact the breeding of dozens or hundreds plant varieties. Therefore, depending on the business strategy of the patent holder, licences can be requested or access to biological resources blocked.

It should be noted that these patents are not limited to plants and seeds, but are also granted on the harvest e.g. kernels, fruits and vegetables and food production. For example, in 2016, patents covering conventionally bred barley and the beer produced thereof were granted to the international companies Carlsberg and Heineken.

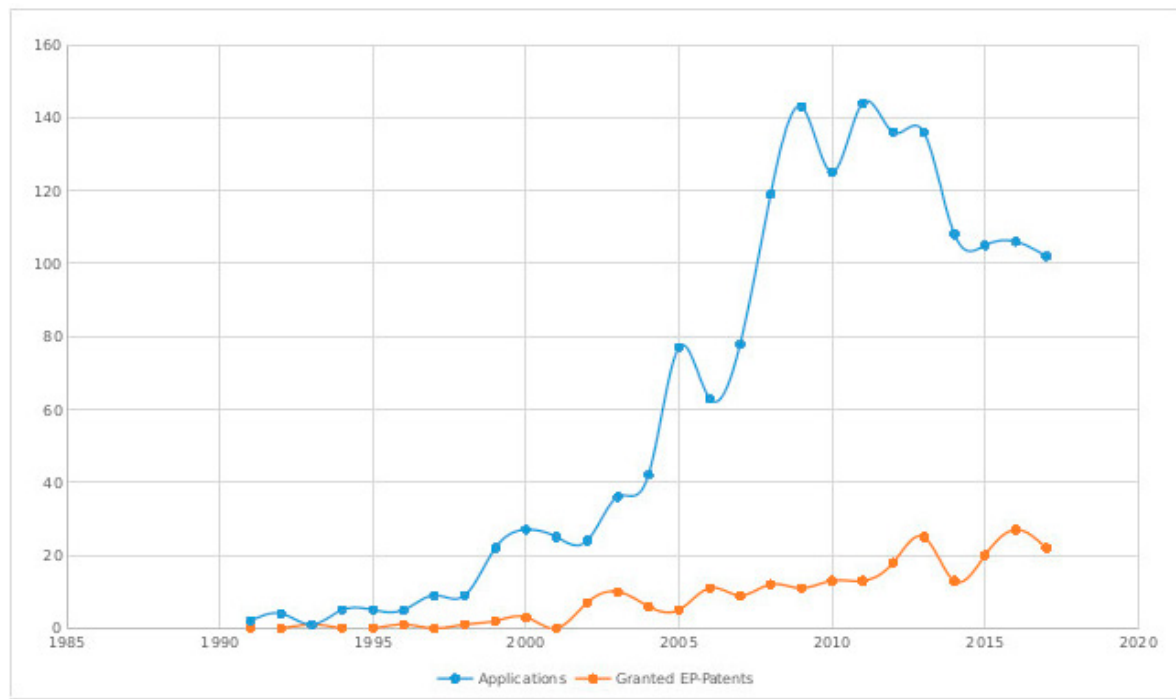


Figure 2: Number of patent applications (Applications) and patents granted on conventional plant breeding (Granted EP-Patents) by the EPO per year (own research).

3. Examples of patents granted in 2018

In 2017, the Administrative Council of the EPO took a decision to prohibit patents on plants and animals derived from “essentially biological” (conventional) processes for breeding. Shortly afterwards, the Implementing Regulations of the European Patent Convention and its Examination Guidelines were changed accordingly.

Nevertheless, in 2018 the EPO granted around a dozen patents on conventionally bred plants. These patents claims were for e.g. melons, cucumber, lettuce, onions, garden parsley and tomatoes. The relevant traits were resistance to powdery mildew, adaption to climate change, longer shelf life and others.

Interestingly, within this period of time, not a single patent was granted to any of the ‘seed giants’ such as Bayer (Monsanto), Syngenta or DowDuPont: it appears that the EPO was afraid of further public protests against these patents and therefore refrained from granting them. However, looking at the patent applications, it is evident that the large companies were still very actively engaged: in 2018, around 60 new patent applications covering conventionally bred plants were filed, at least one third of these were filed by the ‘seed giants’.

One example of current EPO practice is a patent on melons (EP 2681234) granted to Enza Zaden and Keygene: the patent covers a trait conferring powdery mildew resistance. The desired genetic information was derived from natural plant populations of another species. The DNA sequences were transferred via genetic engineering into the melon plants. The patent however claims all plants which show the relevant genetic information, including if derived from conventional breeding. It is not clear whether relevant DNA sequences might also be present in melons derived from conventional breeding. The case shows how easy it is for companies to expand their patent claims from methods of genetic engineering to conventional breeding.

Another example is a patent on a lettuce produced by the Dutch company Rijk Zwaan (EP 2966992): in the patent, the company claims lettuce seeds, plants and the harvest of lettuces that grow in a hotter climate. The trait, which is also known from wild lettuce species, is supposedly helpful in the adaption of the plants to ongoing climate change. The seeds are derived from conventional breeding and no genetic engineering is involved. According to the text of the patent, all the lettuce seeds, the plants and offspring showing the desired traits are claimed. The patent creates the impression that this trait could also be derived from genetic engineering. Thereby, a technical, patentable invention is falsely used to turn conventional breeding into an ‘invention’. *No patents on seeds!* has filed an opposition against the patent.

In 2018, some decisions were taken on oppositions filed with the involvement of *No patents on seeds!* (see Table 1). These decisions were also impacted by huge legal uncertainties: in October 2018, oppositions against two patents held by Carlsberg and Heineken on barley (EP 2373154 and EP 2384110) were rejected. The barley plants show mutations that are derived from random processes. The patents however not only cover the barley plants but also their usage in the brewing process and the resulting beer. *No patents on seeds!* has filed an appeal against the decision.



Figure 3: Patents on beer were granted to Carlsberg and Heineken in 2016 and opposed by *No patents on seeds!*. In 2018, the oppositions were rejected. *No patents on seeds!* appealed the decision.

The EPO also revoked the patent on Monsanto's 'severed broccoli' (EP 1597965). This broccoli variety is supposed to grow a little bit higher and can therefore be harvested more easily. Monsanto (Bayer) has announced it will file an appeal against the decision. Furthermore, Syngenta withdrew a patent on tomatoes (EP 1812575), which was opposed by a record number of more than 60.000 opponents.

In summary, although there have been some important and successful cases, the EPO just continues to grant further patents on conventional breeding. However, such decisions on patents cannot simply be decided on a case by case basis. The respective prohibitions have to be phrased in a way that ensures legal certainty and clarity, and does not leave any room for misinterpretation.

The EPO is putting its own interests (it generates income from fees) and those of its 'business partners' (industry and patent attorneys) above the interests of the public, political decision-making and existing law.

Table 1: Overview of legal cases with involvement by *No Patents on Seeds!* against patents on plants

Patent number	Company	Content	Current state of proceedings
EP 2966992	Rijk Zwaan Zaadteelt	Lettuce seeds and plants as well as harvest there off.	Opposition filed 2019.
EP 2373154	Carlsberg/Heineken	Barley & Beer	Opposition filed 2016. Opposition rejected in 2018. Appeal filed in 2019.
EP 2384110	Carlsberg/Heineken	Barley & Beer	Opposition filed 2016. Opposition rejected in 2018. Appeal filed in 2019.
EP 2575433	Carlsberg/Heineken	Barley & Beer	Opposition filed 2017
EP 2134870	Monsanto	Selection of soybeans	Opposition filed 2014. Opposition rejected in 2017, appeal is pending.
EP 1515600	Syngenta	Tomato	Opposition filed 2016. The patent was revoked in 2019.
EP 1962578	Monsanto	Melon	Opposition filed 2011. The patent was revoked in 2016, appeal is pending.
EP 1597965	Monsanto	Severed broccoli	Opposition filed 2013. The patent was revoked in 2018.
EP 1812575	Monsanto	Tomato	Opposition filed 2014. Patent revoked 2014.
EP 2140023	Syngenta	Pepper	Opposition filed 2014.

4. Differences between genetic engineering and conventional breeding

Essentially, conventional breeding is always based on a wide range of genetic and biological diversity found in natural populations, as well as in previously bred plant and animal varieties and breeds. In addition, new mutations happen continually and can, for example, be triggered in plants by exposure to sunlight. Not all of these mutations are beneficial. Crossing and selection are, therefore, crucial to breeding plants with desirable traits with optimal combinations of genetic information.

Other additional techniques can be used to increase genetic diversity e.g. by exposing the seeds to specific chemicals to increase the natural rate of mutation. This process is known as mutagenesis, which, in a first step, enhances genetic diversity through known biological mechanisms. The plant genome reacts to external stress factors and the desired traits are established in the following steps of crossing and selection.

This process of conventional mutagenesis has been used in plant breeding for many decades and is still widely applied. Experts estimate that there are already thousands of varieties grown based on random mutation. Until now, all these varieties could be used freely to produce the next generations of plants and varieties. However, patents can severely hamper or block access to these plants for other breeders. In many varieties, patents might well accumulate with every further step in crossing. This could seriously disadvantage small to medium size breeders, as well as damage overall innovation and diversity in plant breeding.

As a result, breeding through mutagenesis can generate greater genetic diversity, but the desired traits are not brought about by direct technical intervention. Plants and animals with the desired traits are the result of cross breeding and selection of particular plants or animals that are chosen from a whole range of biodiversity. This process is time-consuming and requires careful choice by breeders.

Genetic engineering on the other hand uses direct technical and targeted intervention to establish new traits. These technical interventions bypass natural biological mechanisms governed by evolution, inheritance and gene regulation, and are much faster than conventional breeding. For example, additional gene sequences can be directly inserted into the genome. Genetic engineering intervenes directly in the genome, and therefore the resulting plants and animals can be very different to those from conventional breeding. This is a fundamental difference between genetic engineering and 'essentially biological processes' for breeding.

5. The situation in 2019

The situation has worsened in 2019 in comparison to 2018: in December 2018, the Technical Board of Appeal at the EPO announced that the adoption of the Administrative Council decision (June 2017) was not legally binding (T 1063/18). The reasoning: while processes for the conventional breeding of plants and animals are non-patentable, this prohibition does not apply to plants and animals derived from these processes. The wording of the prohibition as stated in law only referred to processes.

With its interpretation of the existing law, the EPO has followed the arguments put forward by Syngenta, which wants to defend its patent on sweet pepper and other food plants. Monsanto (Bayer) now also wants to profit from this decision: as mentioned, the company has requested that its patent on broccoli, which was revoked after an opposition by No Patentes on Seeds! (EP 1597965), is reinstated.

The role of the President of the EPO, António Campinos, is now crucial in these proceedings: the chaotic legal situation means that he needs to stop ongoing proceedings to ensure that no further such patents are granted. At the same time, the Administrative Council needs to take action. The decisive question: will the governments of the 38 contracting states of the EPO prevail against the interests of industry, patent attorneys and the EPO and come up with new, legally binding rules for current patent law that can stop any further patents on conventionally bred plants and animals? According to the wording of the European Patent Convention, this is precisely what they need to do.

From the perspective of many contracting states, such a clarification is also absolutely necessary because the new EPO practice is in contradiction to their own national patent laws, which explicitly prohibit such patents, or are interpreted in that sense.

If the Administrative Council can not come to legally binding solution in regard to the Implementing Regulations, the text of the EPC has to be changed. For this purpose, the Administrative Council can make use of Article 33 of the EPC which gives the competence to amend the text of the EPC, if there is a contradiction to the patent law of the EU. This situation now became reality: In November 2018, in a joint meeting of the EU Commission and the EU Member States, it was made evident that most of the Member States have either already implemented the relevant EU prohibitions or are interpreting their laws in that sense. Already in 2012 and 2015 the EU Parliament took a very similar legal position. In result, all three institutions of the EU (Commission, Parliament and Member States) share the same position in regard to the correct interpretation of the EU law.

If the Administrative Council is not able to solve the problem by this strategy, a diplomatic conference needs to be organised. A conference of the contracting states, the first for several years, would have the power not only to change the interpretation of existing law, but also to change the law itself in way that would eliminate controversial EPO decisions. Under the circumstances, the most effective solution would be a general prohibition of patents on plants and animals.

Patents granted so far in 2019 show the need for clear and quick decision-making: there have already been two patents granted to Rijk Zwaan on lettuce. One of these patents claims lettuce which browns less after being cut (EP 2428112), the other concerns resistance to plant diseases (EP 2484200).

Another patent was granted to the US company CIBUS (EP 2700721) where genome editing had been used to achieve herbicide resistance in oilseed rape (canola). This patent is another example of how patent claims are expanded from genetic engineering (genome editing) to conventional breeding with far reaching consequences: the relevant genetic information was originally found in plants showing spontaneous mutations, but according to patent, the plants are derived from genetic engineering (genome editing). Once again, the patent

also claims plants showing the specific genetic condition without being genetically engineered. The list of relevant plants species goes far beyond oilseed rape: other species being claimed include “sunflower, tobacco, sugar beet, cotton, maize, wheat, barley, rice, sorghum, tomato, mango, peach, apple, pear, strawberry, banana, melon, potato, carrot, lettuce, onion, soya spp, sugar cane, pea, field beans, poplar, grape, citrus, alfalfa, rye, oats, turf and forage grasses, flax, oilseed rape, cucumber, morning glory, balsam, pepper, eggplant, marigold, lotus, cabbage, daisy, carnation, tulip, iris, lily, and nut producing plants.” According to our knowledge, this is the first European patent to be granted on a daisy.

6. Growing market concentration and increasing dependencies

This development must be seen in the context of growing concentration in seed markets, food production and agriculture, globally and in Europe. After the takeover of Monsanto by Bayer and the fusion of Dow Agro-Sciences with DuPont to DowDupont together with its affiliated seed company Corteva, the agrochemical companies dominate the international seed market more than ever before. Together with the third largest seed company, the Swiss-based Syngenta, around 60 percent of the international trade in seeds will be controlled by just three companies. Another big player is BASF which took over large parts of the Bayer seed business.

Patents are one of the most crucial legal and political mechanisms that benefit large-scale, industrial agriculture at the expense of small-scale, regional plant breeders and farmers. Put bluntly, patents put the sustainability of our agriculture and our food security at risk.

Patents on conventional breeding would dramatically change the situation for farmers, growers and breeders. In future, especially breeders who do not sign contracts with the patent holder would have no access to the patented seeds – neither for growing, for propagation nor further breeding.

The rise in the patenting of plants is of serious concern to many stakeholders, including traditional breeders, farmers who save, multiply or even breed their own seeds or animals. In addition, developing countries might be forced to allow patents on seeds through free trade agreements. Vegetable growers and farmers will become dependent on just a very few companies. Consumers, food producers and retailers will find themselves in a situation where prices and choice in food products are decided by companies such as Bayer (Monsanto).

As a consequence, agro-biodiversity will also decline if only a few companies are able to determine which patented “super seeds” will be grown in the fields. Agro-biodiversity is one of the most important pre-conditions for the future of breeding, environmentally-friendly agriculture and the adaptability of our food production to changing conditions, such as climate change. Seen from this angle, it is a development that is problematic not only for specific sectors or regions, but one that can threaten agro-biodiversity, ecosystems and the adaptability of our food production systems to meet challenges such as climate change. This makes it a huge risk for global food security and regional food sovereignty.

7. What needs to change

There are three crucial areas that need changing to make current prohibitions of patents on plant and animal varieties and essentially biological methods for breeding effective:

1. Definition of essentially biological processes

It has to be clarified that the term “essentially biological processes” covers all conventional breeding processes, including random mutagenesis, as well as all individual steps in the process, such as selection and / or propagation.

2. Definition of ‘products’ used or derived from breeding

It has to be clarified that all “products” used in or emanating from essentially biological processes are captured by the exclusion from patentability, including all plant/animal parts, cells and genetic information.

3. Limiting the scope of protection

In the context of plant and animal breeding, the EPO must not grant “absolute product protection” which enables a patent on a plant or animal derived from a technical process to be extended to all conventionally bred plants with the same traits.

Finally: only patent attorney and industry lobby groups are allowed to participate in the decisive meetings at the EPO and are the only ones to have access to the relevant information. It is clear that a fundamental reform of the EPO is required to ensure the EPO meets the usual standards of transparency and democratic accountability to be expected of a public body in the 21st century.