



Patents filed on conventionally bred plants: Research from 2023

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NO PATENTS ON SEEDS!



- 2007: start of a European coalition,
- since 2018 Non profit organisation
- 18 member organisations from Austria, Belgium, Denmark, Germany, the Netherlands, Portugal, Switzerland and the UK.





What we do

- patent research, publish reports
- exchange with experts (EPO, EU, national ministries & patent offices)
- build a network between European organisations
- oppositions on patent cases
- public campaigns, media work, mobilisation

GOAL: Clear regulations that exclude plants and animals derived from conventional breeding from patentability!





Research from 2023



Seed patents: A huge challenge for the European Union

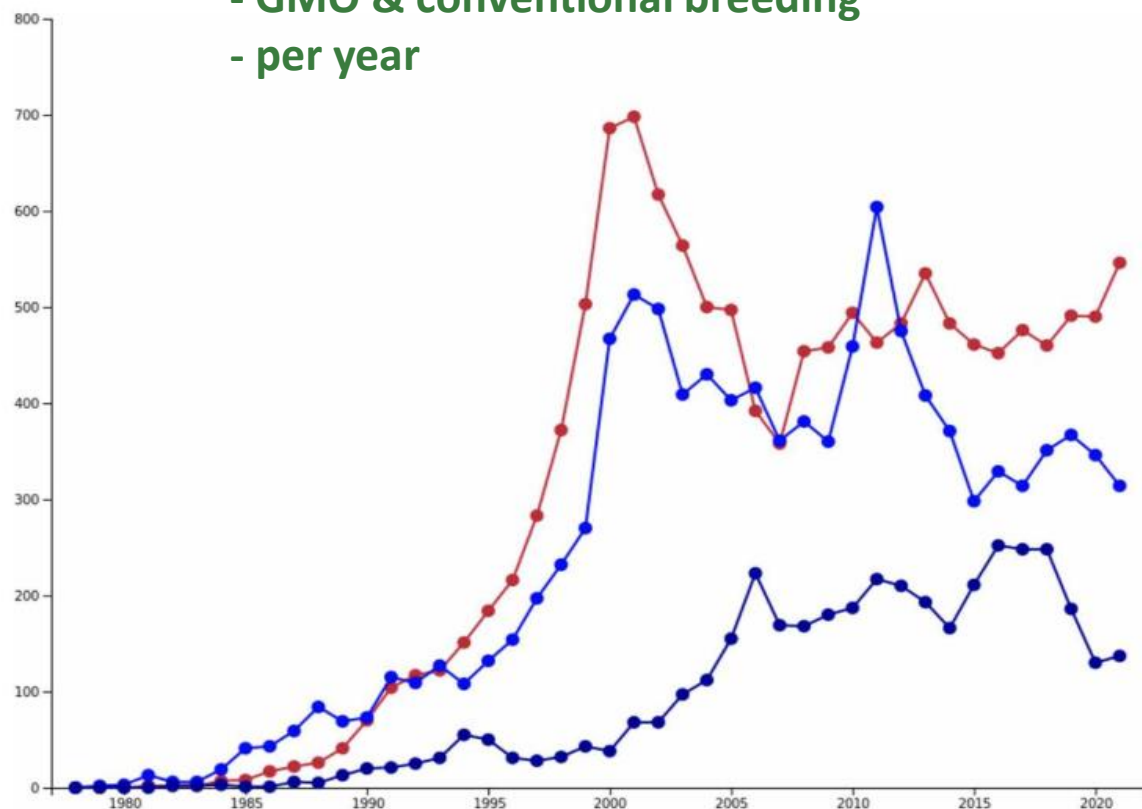
Analysis of the problem, case studies and potential solutions

<https://www.no-patents-on-seeds.org/en/report-2024>



Patents on plants – an overview

- GMO & conventional breeding
- per year



patent applications,
worldwide

patent applications,
European Patent Office

patents granted,
European Patent Office

Figure 1: Number of all patent applications filed for plants under the PCT/WIPO (upper / red line) and at the EPO (middle / light blue line), including patents on plants granted by the EPO (lower / dark blue line) per year. Research according to official classifications (IPC A01H or C12N15/82). Source: www.kein-patent-auf-leben.de/patentdatenbank/



NGT-plants: patented by routine by the EPO

- Patents on plants obtained by new genetic engineering (NGT) are routinely granted in Europe and the US, and large international corporations, such as Corteva (formerly DowDupont) and Bayer, are currently spearheading this development.
- Medium-sized European breeders that want to use the new technology are often forced into signing contracts with larger corporations, and thus into dependencies.
- In many cases, the scope of NGT patents is not limited to the genetically engineered plants.





Patents granted by the EPO in 2023

- 80 patents on plants granted in 2023, of these 20 on conventional breeding
- plant species: cucumber, maize, melon, oilseed rape, pepper, spinach, tomato, wheat
- patent holders: Nunhems/BASF, Enza Zaden, KWS, Rijk Zwaan, Seminis/Bayer and ChemChina/Syngenta





Examples for patents granted by the EPO in 2023

Table 1: Examples for patents involving conventional plant breeding, granted by the EPO in 2023

Patent number, patent holder	Plant species	Content
EP 3016505 Rijk Zwaan	Sweet pepper	Plants with new flavor
EP 3016504 Rijk Zwaan	Sweet pepper	Fruits with increased sugar content
EP 3368677 KWS	<i>Beta vulgaris</i>	Inhibition of bolting and flowering
EP 2635683 Arista	Wheat	High amylose kernels
EP 2825024 Nunhems (BASF)	Tomato	Virus resistance to tomato yellow leaf curl virus
EP 3250694 Rijk Zwaan	Melon (<i>Cucumis melo</i>)	Fruits without seeds
EP 2773185 Rijk Zwaan	Spinach	Resistance to downy mildew
EP 2330886 Enza Zaden	Melon (<i>Cucumis melo</i>)	Virus resistance to cucumber vein yellowing virus
EP 2966988 Rijk Zwaan	Cucumber	Dark green color
EP 2708115 Seminis (Bayer)	Broccoli (<i>Brassica oleracea</i>)	Improved nutritional value after crossing with wild relative species



Random mutations as ‚Trojan horse‘ to patent conventionally bred plants

- Random mutagenesis is the main entry point allowing the EPO to issue patents which impact conventionally-bred varieties.
- Plants obtained from random mutagenesis were introduced into the European markets without ever being patented, and have been used freely for decades in conventional breeding.
- However, the EPO has extended the limits of patentability to conventionally-bred plants, thus going beyond what was intended by the law (such as the EU patent directive 98/44/EC).





Random mutations as ‚Trojan horse‘ to patent conventionally bred plants

- Random mutagenesis uses physical and chemical triggers to generate higher genetic diversity (additional mutations at random). These processes do not enable the targeted introduction of a new trait.
- In patent law, random mutagenesis has to be treated differently from processes of new genetic engineering.





Rule 28 (2): recent legislation meant to stop patents on conventional breeding

- The Administrative Council of the EPO decided in June 2017 that patents on conventionally-bred plants and animals would no longer be granted, and the new Rule 28(2) was subsequently introduced into the Implementing Regulations of the European Patent Convention (EPC).





Patents granted under recent legislation



- A patent on maize with improved digestibility (EP3560330, company KWS) was already identified in research conducted in 2022: The KWS patent claims the maize plants, regardless of whether they are derived from random mutations or genetic engineering.
- As indicated in the patent description, the respective gene variants were detected in existing maize plants obtained from conventional breeding.



Patents granted under recent legislation



In 2023, a patent claiming Christmas Star with white foliage was granted to a company called Klemm (EP3747263).

This patent also included claims on plants obtained from random mutagenesis (including UV-light as a trigger) and from NGTs.



New Rule 28 (2) does not stop the EPO from granting patents on conventional breeding

- In both cases (maize and Christmas star), the claims include natural genes that are used to select the required traits, thus undermining the processes of crossing and selection.
- In result, these claims create broad 'monopoly' rights, as they include both the use of natural genes for selection and breeding and the plants obtained from random mutagenesis.
- This gives the patent holder extensive, comprehensive control over biological resources needed in conventional plant breeding.





Patent applications published in 2023

- In 2023, around 300 international patent applications filed for plants, of which more than 70 included conventional breeding
- Around one third out of these claim plants obtained from random mutagenesis.





Case study: A patent thicket blocks conventional breeders



- tolerance / resistance to Tomato Brown Rugose Fruit Virus
- gene variants known from existing tomato plant populations
- patent applications cover dozens of gene variants.
- patent thicket: at least 20 international patent applications filed by ten different companies, e. g. BASF, Bayer, Rijk Zwaan and ChemChina/Syngenta
- At least one patent (EP3629711, filed as WO2018219941) was granted already. Another patent (EP3720272, filed as WO2019110821) seems to be just about to be granted.

Patents filed on tomatoes with resistance to ‚Jordan Virus‘

Company	Number of patent application	Number of chromosomes with specific gene variants	Technical toppings in addition to crossing & selection
Vilmorin	WO2018219941	Chromosomes 6,9,11	Random mutagenesis
Rijk Zwaan	WO2019110130	Chromosomes 6, 11, 12	-
Rijk Zwaan	WO2019110821	Chromosome 11	-
Seminis	WO2020018783	Chromosome 11	-
Enza Zaden	WO2020148021	Chromosome 8	-
Vilmorin	WO2020249996	Chromosome 11	Random mutagenesis
Vilmorin	WO2020249798	Chromosomes 6,9,11	Random mutagenesis
Rijk Zwaan	WO2021110855	Chromosome 11	Random mutagenesis and NGT
Rijk Zwaan	WO2021170868	Chromosome 11	Random mutagenesis and NGT
BASF/Nunhems	WO2021213892	Chromosomes 2 and 11	-
Vilmorin	WO2021245282	Chromosome 9 or 11	Random mutagenesis and NGT
Rijk Zwaan	WO2022013452	Chromosome 8	-
Philoseed	WO2022018734	Chromosomes 2 and 11	-
Tomatech	WO2022234584	Chromosome 1,2,3,4,6,9,11	-
Vilmorin	WO2022117884	Chromosome 9	Random mutagenesis and NGTs
Volcano Institute / Israel	WO2022091104	Chromosome 9	Random mutagenesis and NGTs
Volcano Institute / Israel	WO2023095144	Chromosome 9, 11	Random mutagenesis and NGT
Rijk Zwaan	WO2023135335	Chromosome 8	Random mutagenesis and NGTs
Syngenta	WO2023156569	Chromosome 1	-
Philoseed	WO2023144828	Chromosome 2	-

granted

about to be granted





The case of a breeder



Frans Carree, Dutch organic breeder De Bolster, describing how his efforts to develop a tomato resistance to the brown rugose fruit virus are made very difficult:

“In order to develop his own virus-resistant tomato, Carree would need to read all patent applications to understand which traits the companies have filed a patent application for. The patent applications are written in such complicated language, however, that he sometimes struggles to understand them. He would then need to ask a laboratory to sequence all of his plants to make sure that the patented trait is not included in his varieties – a time and cost intensive task.”

www.euronews.com/green/2024/08/18/europes-seeds-are-being-privatised-by-patents-and-it-could-threaten-food-security



Overall impact on conventional breeders

- The PINTO database (European Seed Association):
 - 115 European patents
 - 1365 varieties affected by these patents, comprising more than 40 plant species
 - more than 400 varieties are currently affected by more than just one patent
 - one single variety can be affected by up to six patents

www.euroseeds.eu/pinto-patent-information-and-transparency-on-line
(June 2024)



More than 1.300 European plant varieties impacted by patents

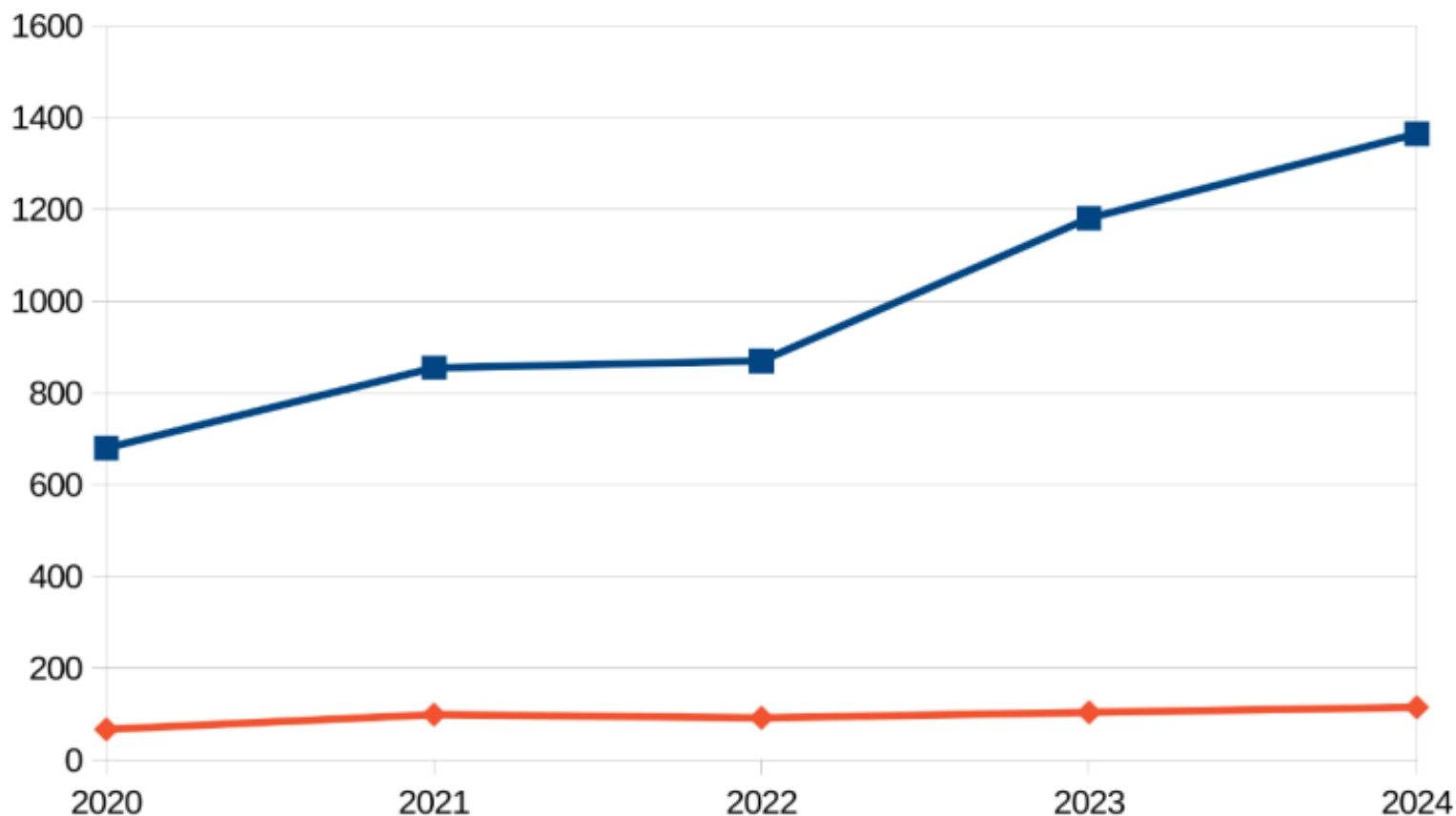


Figure 2: Number of European patents (red line) and of conventionally-bred varieties (blue line) affected by patents from mid-2020 until mid-2024 (data collected by *No Patents on Seeds!* from the PINTO database).



Patents on seeds: a hot potato in the EU

Currently, in context of NGT legislation, the EU parliament and the EU member states are trying to find a solution to stop patents being issued on biological resources needed for breeding. There is a strong political consensus in the EU to not allow patents on conventional seeds.

The EU, therefore, at least needs to find solutions to secure the freedom to operate for conventional breeders and, at the same time, restrict the scope of patents granted on genetically engineered plants, including seeds obtained from new genetic engineering (NGT). This is an urgent problem which must be solved in order to safeguard the future of European plant breeding, agriculture and food production.



The EU at the crossroads: Demands

1. Strengthening the existing prohibitions in respect to conventional breeding.

This could be resolved simply by correcting the interpretation of the EPC. This could be achieved by the Administrative Council of the EPO and/or by amending EU patent directive 98/44, as the latter is used as a guideline for interpretation of the EPC. At the same time, there is also the option of amending national patent laws.

2. Change the EPC to exclude all patents on plants (and animals) even if they are obtained from genetic engineering.

The necessary steps can only be taken by a diplomatic conference of the contracting states of the EPC. It would need to be followed by mandatory changes in the national patent laws. This would mean that the EU patent directive would no longer be applicable.