

Seed monopolists increasingly gaining market control

Applications and granting of patents in the sphere of animal and plant breeding in 2010

Christoph Then & Ruth Tippe
März 2011



Publisher of this report is the international coalition
«No Patents On Seeds» / www.no-patents-on-seeds.org:

EvB
Erklärung von Bern
Dichiarazione di Berna
Déclaration de Berne

GREENPEACE



MISEREOR
IHR HILFSWERK

SWISSAID

UTVIKLINGSFONDET
THE DEVELOPMENT FUND • IL FONDO DE DESARROLLO

Contents

Summary	2
1. Overview of number of patents in the sphere of animal and plant breeding.....	4
1.1 Plant breeding applications	4
1.2 Plant breeding patents granted	6
1.3 Corporations behind patent applications in plant breeding.....	7
1.4 Patents on animal breeding	8
2. Scope of patent applications and possible impacts.....	9
2.1 Conventional breeding and agriculture	10
2.2 Conventional breeding and vegetable cultivation.....	10
2.3 Genetically modified plants	11
2.4 Biomass and energy production.....	12
2.5 Animal breeding	13
2.6 Food	13
3. Patents granted.....	14
3.1 Genetically modified plants	14
3.2 Conventional breeding	15
3.3 Animal breeding	16
4. Legal appraisal and conclusions	16

Summary

Two important decisions concerning the patentability of the conventional breeding of plants and animals were made at the European Patent Office in 2010. The EPO's Enlarged Board of Appeal decided, based on a precedent set by the cases concerning broccoli and tomatoes, that methods for conventionally breeding plants are not patentable (G2/07 and G1/08). But the EPO's Board of Appeal had also already decided back in May 2010 that conventionally-bred plants, their seed and products of harvests, may themselves be patented even if the process for breeding them cannot be (T1854/07).

This research examines how patent applications and the granting of patents developed at the European Patent Office in 2010. It also examines how the EPO has dealt with other applications for patents on conventionally bred plants following the decision on the broccoli patent.

The report shows a steadily increasing number of patent applications and patents granted at the Patent Office. According to the research some 250 applications were made in 2010 for patents on genetically modified plants, and another 100 on plants bred without using genetic engineering. The proportion of patents on conventional breeding in the applications being filed by the Monsanto, Syngenta and Dupont corporations is increasing; these companies are now making some 20 to 30 per cent of such patent applications (in the sphere of plant breeding). Approximately 200 patents on seed with and without the use of genetic engineering were granted by the European Patent Office in 2010.

About 25 patents in the sphere of agricultural animal breeding and the production of related foods were applied for in 2010. Some of these extend from feedstuff through animals to meat, milk and eggs. Four patents were granted in the sphere of animal breeding. These included one patent on fish which had been treated with growth hormones.

The patents are extremely problematic not only in their number but also in their scope. Many of the applications, and several of the patents granted, cover the entire food production from the farmer to the food manufacturer. In 2010 Monsanto for example applied for a patent on biscuits and margarine in which its genetically modified soybeans are supposed to be processed. At the same time Monsanto wants to use patent claims to safeguard itself against seeds and food being investigated for contamination by genetically modified plants without the corporation's consent. Monsanto, Dupont and Bayer are among the corporations which in 2010 also obtained patents which actually extend from seeds to harvests.

Monsanto and Syngenta filed a large number of patents on conventionally-bred vegetables such as cucumber, tomatoes, sweet peppers, pumpkins and melons. In the meantime some 100 patent applications in the conventional vegetable sphere are known of. The majority of these applications were made between 2000 and 2010, and several have already been granted.

BASF is attempting to make particular profit from climate change. The chemical corporation has obtained a patent on thousands of various genetically modified plants which it suspects could have traits that might be useful through having higher yields or resistance to environmental stress. The aim is that the plants be manipulated to this end even with genes from pathogens.

Companies like Syngenta, Dupont, Dow AgroSciences and Monsanto are also trying to monopolise plants which come from the regions of origin of crop plants, like Asia and central America, as their

inventions. These companies have systematically examined the genes of plants such as corn and Indian mustard for interesting genetic material, and applied for patents on them.

The research shows that the European Patent Office wants to grant patents on seed, plants and food produced with the help of conventional breeding in the future too. Examiners at the EPO for example wrote in January 2011 to the Seminis company, a subsidiary of the US Monsanto corporation, informing it there were no fundamental objections to its EP 1026942 patent application. The company wants patented as its invention tomatoes which have not been genetically modified and have less core. Similar notifications have been sent to other companies, saying a process could not be patented but the products such as seed, plants and food certainly could.

The EPO's decisions in the cases concerning broccoli and tomatoes (G2/07 and G1/08) in December 2010 set a precedent whereby processes for breeding plants and animals basically cannot be patented. This research now shows that the EPO interprets the ban on patenting "essentially biological processes for the production of plants or animals" in such a way that only *processes* for conventional breeding cannot be patented, but the *products* resulting from these processes certainly can. If this trend continues the legal ban will as far as possible lose its effect.

Corporations will thus continue to be able to abuse patent law in Europe and gain control over the production of foods. The consequences affect both consumers, breeders and farmers in Europe, and developing countries as they suffer from steadily rising prices for food. This development can lead to a situation where there is no longer any seed on the market which is not subject to patent protection, and as such should now be prevented. Against this background the call for effective legal prohibitions must be energetically promoted.

The German government has spoken out against the patenting of plants and animals, as have MPs of all the parties represented in the German Bundestag. Various institutions in the Catholic church in Germany in January also published a joint statement opposing patents on animals and plants. Agricultural organisations in many countries of the world and plant breeders in Germany and the Netherlands have expressed themselves extremely critical of such patenting. The organisations in the No Patents on Seeds alliance now plan joint action at European level to change the patent law. Its aim is a prohibition not only on patents on processes for breeding but also on plants, animals and breeding material like seed and genes.

1. Overview of number of patents in the sphere of animal and plant breeding

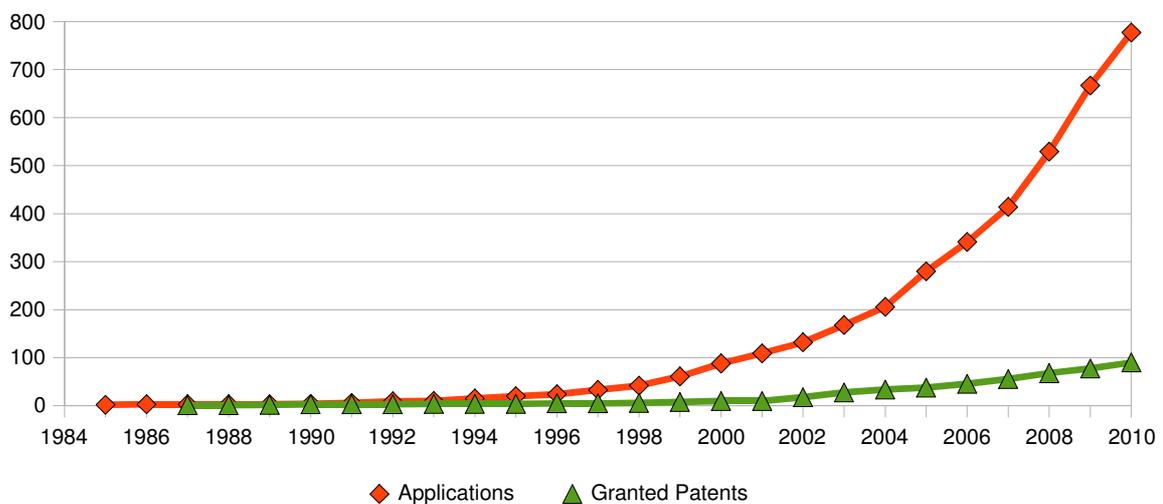
Over 350 applications made for patents on plants and the breeding of plants to the international patent authority in Geneva, the World Intellectual Property Organisation (WIPO), were identified in 2010. Most of these applications, known as PCT applications (PCT being the Patent Cooperation Treaty), have been passed on to the European Patent Office to be examined and, where applicable, granted. They had been adopted from a larger number of patent applications (which were submitted according to international classifications) after examination of the research made on them for the event that their claims affect breeding methods or relevant plants and animals in agricultural use.

Some 68 per cent of these were for genetically modified plants, 16 per cent for breeding methods not using genetic engineering, and the remainder for patents which included both genetic engineering and conventional processes. This means over 30 per cent of the patent applications are covering conventional breeding of plants. These particular applications to varying extents involved processes like marker-based selection, regeneration and reproductive processes, measuring constituent substances, hybrid breeding and mutagenesis, as well as material used in breeding such as seed, genes and parts of plants, whole plants, their harvests and products (sometimes processed) like food, feedstuff and biomass.

1.1 Plant breeding applications

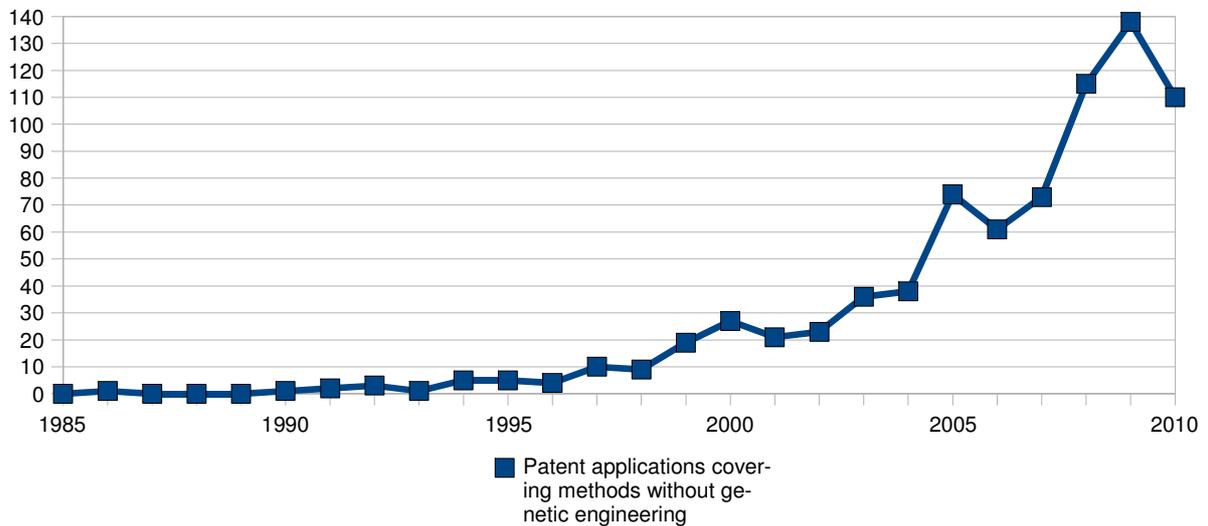
A total of approximately 800 patent applications for conventional breeding (including mutagenesis, genome-based selection, regeneration processes, etc.) have been researched since 1984. About 300 of these are still being processed, almost 100 have been granted by the EPO, and some 200 are seen as having lapsed for various reasons. A further 200 have yet to enter the European phase, meaning they will be officially registered by the European Patent Office. The patent applications have included claims on breeding methods, seed, genetic material, plants and even food and feedstuff made from them, and biomass. The patents also often cover plant varieties which display the traits described in the patent.

Figure 1: Accumulated figures for PCT patent applications and EP patents granted
Plant breeding without genetic engineering, 1984-2010



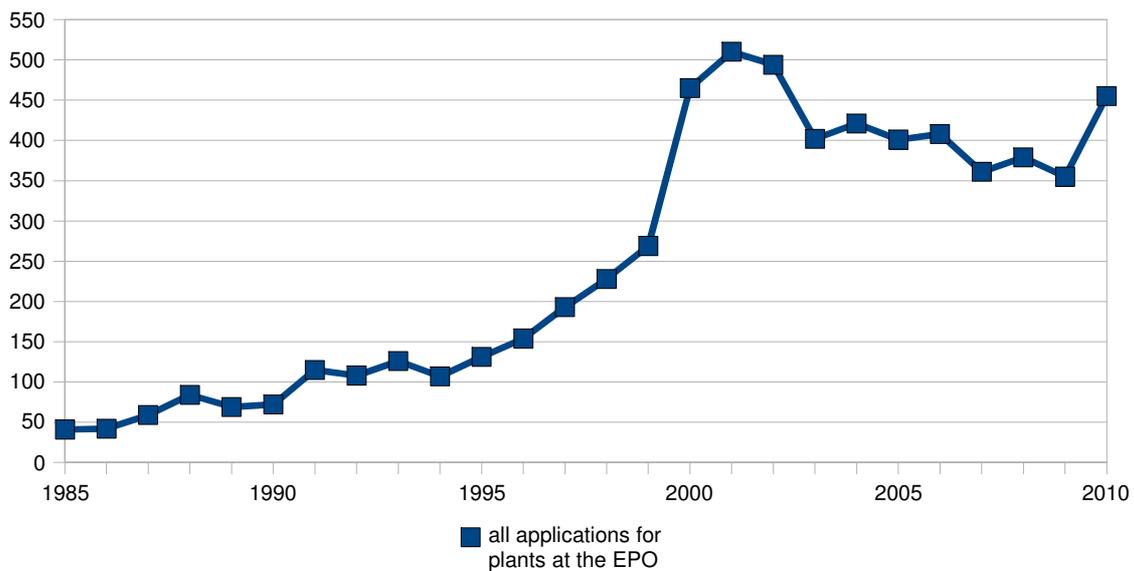
The research shows the volume of patent applications for plant breeding not using genetic engineering continues to remain high. Over 100 new applications have been registered each year in the last three years, while far fewer were in the years beforehand.

Figure 2: Patent applications per year for plant breeding without genetic engineering



The number of patent applications in the sphere of plant breeding showed a clear increase overall. For the first time in several years there was an increasing number of patents on genetically modified plants.

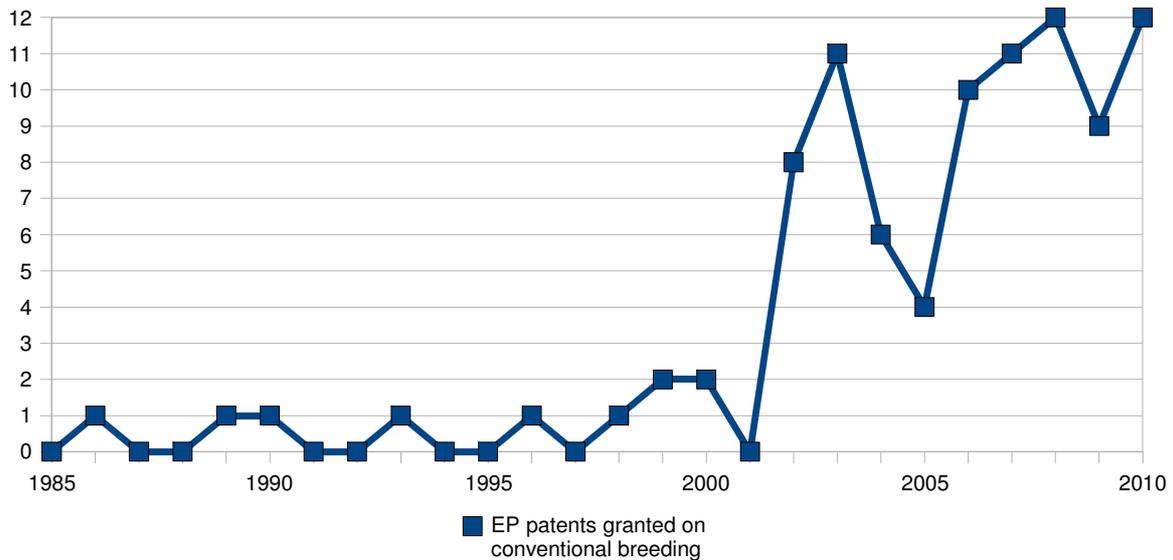
Figure 3: Total patent applications per year in sphere of plant breeding



1.2 Plant breeding patents granted

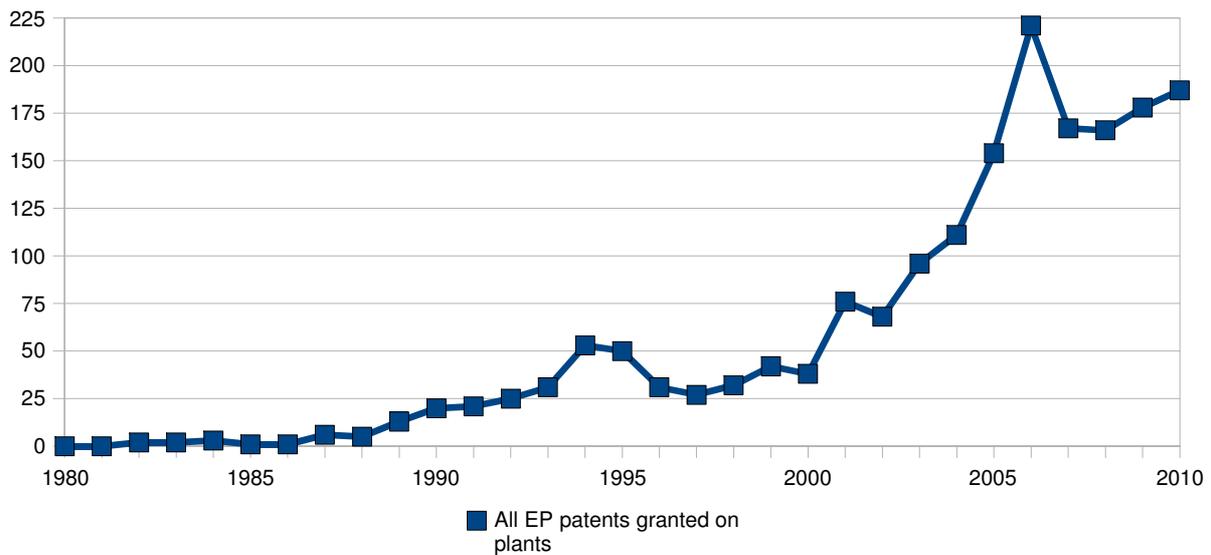
To date roughly 100 patents covering plant breeding without the use of genetic engineering have been granted by the European Patent Office since 1984 (see Fig. 1). About a dozen of these were granted in 2010. In addition, a patent on conventional sunflowers (EP 1185161) was approved in an appeal procedure (T 1854/07).

Figure 4: Number per year of grants of patents on plant breeding without use of genetic engineering



Some 200 patents in the sphere of plant breeding including genetically modified plants were granted by the EPO in 2010. These ranged in different cases from methods for breeding, genetic material such as genes, seed, plants and the products derived from their harvests (see below). Many also covered corresponding plant varieties without this being expressly noted in the claims. Altogether, according to the European Patent Office's statistics, approximately 1,800 European patents in the sphere of plant breeding have been granted since 1984.

Figure 5: Number per year of patents granted for plant breeding



1.3 Corporations behind patent applications in plant breeding

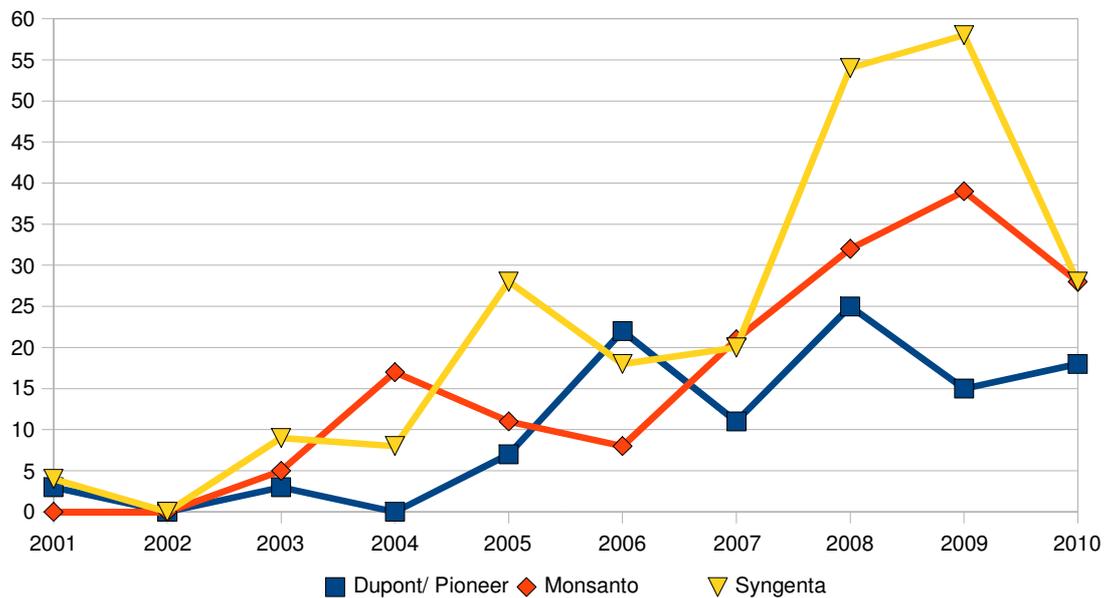
A total of 282 PCT patent applications in the sphere of plant breeding were registered by the US company, Monsanto (not including companies which had been bought up, like Seminis, De Ruiter, DeKalb and Calgene). 77 of these partly or wholly covered the area of breeding without the use of genetic engineering. Monsanto's subsidiaries have filed for numerous other patents covering to varying extents breeding without genetic engineering. De Ruiter and Seminis, which are major vegetable breeders, have for example filed a total of 28 patent applications, 27 of them for breeding without genetic engineering.

Dupont / Pioneer have made 525 applications, 39 of which are partly or wholly without the use of genetic engineering. In the case of Syngenta there have been 185 applications, 23 of which cover not using genetic engineering wholly or in part. Bayer have accounted for 109 applications (eight wholly or in part involving breeding without genetic engineering), and BASF 322 (19 wholly or in part concerned with breeding without genetic engineering).

It should be noted that the effects on the market cannot be deduced directly from the number of patent applications made. The significance for the market is the result, rather, of the interaction between the patents, the takeovers of important seed companies and, where applicable, collaborations with other big corporations. Monsanto, especially, has in this way a powerful monopoly in seeds. Not only has it bought up major companies like DeKalb, Seminis, Delta&Pine, Asgrow, Holden and DeRuiter, and applied for many patents, it also conducts close collaboration in research with other corporations like BASF and the Kleinwanzlebener Saat seed breeding company. Monsanto is attaining a position of market control – sometimes from the growing of crops to their consumption – through a network of companies and patents in many areas. Veritable cartels have come into being in the last few years here through the actions and interactions of some corporations. These have acquired a great influence on what is researched, what is grown, what gets onto the market and what prices are paid for it.

Overall the number of patent applications for breeding without genetic engineering still seems relatively low when compared to the total number of patents in the sphere of plant breeding. But if this is looked at in relation to the number of patent applications since the year 2000, a steady increase in the proportion of applications for breeding without genetic engineering can be seen with companies like Syngenta, Monsanto and Dupont (see Fig. 6). The overall trend with these companies is unmistakably towards a marked increase in applications in the sphere of plant breeding without genetic engineering. The proportions have risen from very low percentages of under five per cent up until 2002 to 25-30 per cent, even though the number of applications for patents on genetically modified plants also rose again in 2010.

Figure 6: Percentage share of patent applications by various companies covering wholly or in part breeding without the use of genetic engineering, in relation to the number of their patent applications in the sphere of plant breeding



1.4 Patents on animal breeding

Patent applications on breeding livestock have also risen in the last few years. Genome-based breeding has played a part in the applications just as processes to do with artificial insemination and cloning have. The number of applications is clearly lower than those for plants. Between 2008 and 2010, 25 to 40 patents a year were filed for. The applications in different cases comprised, to varying extents, of breeding methods, breeding material such as genes, cells, sperm, oocytes and animals, and also products like milk, meat and eggs. The number of patents issued is still relatively low. But, as the evaluation of genome data in the framework of animal breeding becomes more and more important, it can be assumed that patent applications in this area too will continue to increase.

2. Scope of patent applications and possible impacts

Many patents include all the stages of production and biological materials in all their variations. This is clear, for example, in patent applications by the Monsanto company which cover genetically modified soybeans and go from their feeding to livestock to products like milk, meat and eggs from these animals (WO2010107422). patents already granted, like, for example, that on cultivating sunflowers, extends in its cover as far as oil from the sunflower seeds (EP1185161), and the patent on broccoli includes seed, plants and their edible parts (EP 1069819). What are sometimes trivial technical applications are used as grounds for driving the scope of patents to cover almost anything. The breeder's processing is supposed to also give the patent owner the right to participate in deciding the prices for food.

Compared to the protection of varieties, which is often criticised because it makes it possible to charge farmers for growing from seed from their own harvests, the scope for companies with a monopoly on patents is much bigger. This monopoly affects not only seed and certain plant varieties but also plant material in all its variations (from individual genes to varieties to whole plant species) and to all stages of the breeding and the production of foods or biomass. In addition and unlike with the protection of varieties, other breeders can be refused access to biological material they need for further breeding – innovation is in this way systematically impeded. The change from protection of varieties to patent law puts all the breeding into the hands of corporations which have economic power in the market, which prevail in disputes over patents, buy up competitors and their patents and drive medium-sized companies out of the market.

In the sphere of conventional breeding there is in addition considerable legal uncertainty, since the scope of patents often cannot be determined without incurring considerable expense. If claims are made on genetic combinations that occur naturally, or on plants containing certain substances, it often cannot be determined – unlike where genetic engineering is involved (and artificial genetic constructs can be looked for) – what breeding comes within the scope of the patent. Not only are there legal uncertainties here. There can be considerable costs for transactions and the work of medium-sized breeding companies is inherently systematically blocked.

Farmers and consumers are also threatened with becoming dependent in new ways. Given the increasing number of patent applications, advancing market concentration, and the dynamic that can result from introducing patents in the seed sphere (the gradual displacement of non-patented varieties), it is possible that in a number of years there will be hardly any seed left which is not subject to protection by patent. Patent owners and those profiting from the global process of concentration will in all events acquire increasing control over all the stages of food production. This development will affect consumers and farmers in Europe to the same extent that it will markets and producers in the more heavily agricultural countries of the South. It is to be feared that prices for seed and food will rise and problems of hunger in these countries become more aggravated still. Patents on seed will thus become speculation on hunger.

Finally, patent law does not here encourage innovation. It is systematically abused to gain control over resources and production methods which affect the bases for food and to some extent the production of energy.

2.1 Conventional breeding and agriculture

The production and sale of seed for agricultural plants and cash crops like soybeans and corn are dominated internationally by just a few corporations. One reason for this is the introduction of genetically modified varieties in which all the genes, seeds and plants have been patented. Current research shows that the same corporations that already have a monopoly on genetically modified seed are now extending their claims to the sphere of conventional breeding and in doing so have an eye in part on genetic resources in crop plants' countries of origin. What is also at stake here is the appropriation of the genetic resources of the regions of origin of crop plants.

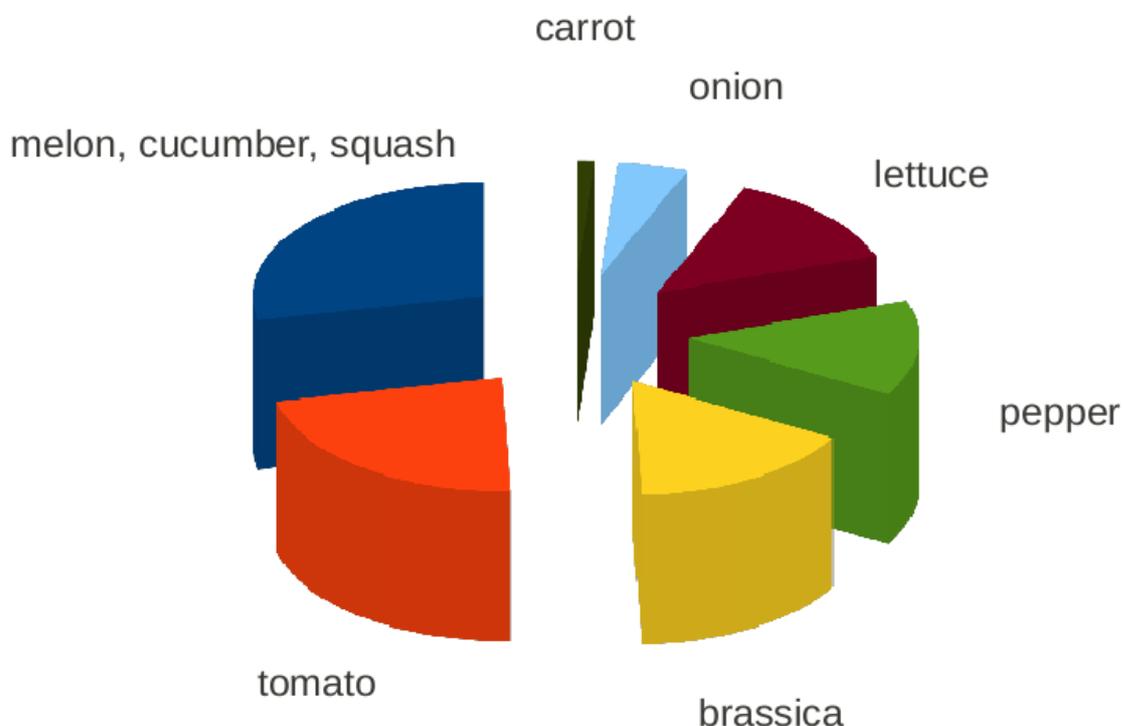
- Example 1: Syngenta "invents" fungus-resistant soybeans
In patent applications WO2010009404 and WO2010096227 Syngenta claims soybean plants and seed as their invention, these naturally containing genes which protect against fungal rust disease (a mould). The soybeans in which the relevant genes are found come from the soybean plants' region of origin in Asia.
- Example 2: Monsanto claims healthy soybeans
In patent application WO2010027948 Monsanto claims the seed of soybeans which naturally contain a particularly high concentration of a health-promoting substance (beta-conglycinin). The effects have been described, most notably by Japanese scientists. Japan has a long tradition of using soybeans – Monsanto now claims this experience and the soybeans involved as an invention.
- Example 3: Dupont discovers fungus-resistant corn
In patent application WO2010045211 Dupont/Pioneer claims corn plants which are examined for genes linked to resistance to certain fungal diseases. Regardless of where these plants were originally cultivated and bred – in Latin America, Europe or the USA – all corn plants examined for these genes are supposed to be an innovation of the Dupont/Pioneer company.
- Example 4: Dow Agrosiences "invents" Indian mustard
In patent application WO2010053541 the US corporation Dow Agrosiences claims Indian mustard (*Brassica juncea*) having a certain quality of oil as an invention. All mustard plants containing such oil are claimed, regardless of how they came to have this. Furthermore the seed, oil and flour used in making food are claimed.

2.2 Conventional breeding and vegetable cultivation

In the area of vegetables, pumpkins and tomatoes, patents are a more recent development, because genetically modified seed has no commercial significance here, and as a result only a few patents were applied for before the year 2000. But in the last few years Monsanto, in particular, has bought up various companies such as Seminis, the world's biggest vegetable breeders, and DeRuiter, one of the most important vegetable breeders in Europe. Monsanto is the leading company in vegetable breeding not only on account of having bought up these firms, it is also the leading company in making patent applications for conventionally-reared vegetables. Of a total of some 90 applications in this sphere filed and documented in the last few years, about 30 were accounted for by Monsanto, Seminis and DeRuiter. Monsanto has also announced it wants to have a licence to market broccoli patented by the European Patent Office. In having made ten applications Syngenta is second behind Monsanto in the sphere of vegetable breeding. The patent applications have regularly made claims on seed, plants and food such as tomatoes, cucumber, melons, lettuce and brassica.

Figure 7 shows the proportion of patent applications divided into different kinds of plant. The most patents applied for so far have been in the groups of cucumber, melons and pumpkins, with 23 applications recorded. 18 patent applications have been filed for tomatoes and 13 for brassica.

Figure 7: Proportion of patent applications (PCT) for individual kinds of plant



2.3 Genetically modified plants

Companies like Monsanto, Dupont, Syngenta, Dow Agrosiences, Bayer and BASF continue to invest hugely in the genetic modification of plants. Often changes are made in existing product developments, and applications made for new patents on plants that are, for example, herbicide-tolerant or produce insect toxins. The US company Monsanto's application, WO 2010025320, for genetically modified plants that produce insect toxins, and WO 2010117735, for rice plants that have been made resistant to glyphosate, are examples of this. In both cases claims are made on genes, plants, plant varieties, seed and the products of harvests, as well as food made from them. In the case of the rice plants, for example, it lists in its claims (Claim 23): "... commodity product selected from the group consisting of whole or processed rice seeds, animal feed, oil, meal, flour, flakes, bran, puffed rice, milk, cheese, paper, cream, wine, alcohol, biomass, and fuel products".

Monsanto not only wants to make money from its products in a new way in food production. It also wants to prevent food from unauthorised third parties being analysed for contamination and mixing with genetically modified plants. The corporation thus claims in the patents above, as in the case of WO 2010024976 and WO 2010037016 (claiming soybeans with enhanced percentages of oil and

food made from them), a monopoly on all analysis of foods for the presence of the genes and parts of plants patented. The corporation has already been accused, on several occasions in the last few years, of impeding access to research material needed by independent scientists for research into risks. It now also wants to prevent food, feed and seed producers from analysing their products for contamination and checking their compliance with labelling obligations.

With the help of conventional breeding, various plant varieties which have higher yields and are better adapted to climate change have been successfully marketed in the last few years. Corporations like Monsanto and BASF now want to open this market for genetically modified plants. A number of different patent applications in this sphere were submitted in 2010, as they had been in previous years. How far actually marketable products will emerge remains to be seen. Unlike how conventional breeding works, genetic engineering does not work with processes of natural gene regulation, which is important with more complex characteristics like enhanced drought-resistance and adaptation to stress factors. In difficult environmental conditions, of all circumstances, there is a danger that the genes additionally introduced will not be able to be controlled and will be insufficiently predictable in their impact.

BASF and Monsanto have as a precaution applied for patents on genes which could be important for breeding here – their applications in some cases include several thousand gene sequences. As a result of their applications *en masse* other breeders are impeded in their work; plant breeding is to become a no-go area occupied by multinational corporations. Monsanto's applications WO 2010039750, WO 2010075143, WO 2010083178 and WO 2010083178, can be cited here. The specifications of the last patent, for example, claim tens of thousands of genes which are said to affect the traits of "enhanced water use efficiency, enhanced cold tolerance, increased yield, enhanced nitrogen use efficiency, enhanced seed protein or enhanced seed oil" (Claim 5).

BASF's patent applications WO 2010020555, WO 2010020654, WO 2010125036, WO 2010127969, in which the genes and seeds of plants, varieties and the harvests of genetically modified plants are claimed, are similarly comprehensive. In particular, "rice, corn, wheat, barley, millet, rye, triticale, sorghum, emmer, spelt, secale, einkorn, teff, milo and oats" (WO 2010125036 Claim 21) are to be manipulated.

2.4 Biomass and energy production

Corporations like Monsanto, BASF, Bayer, Dupont and Syngenta are also active in this sphere. Syngenta has for example filed patent applications concerned with the production of biomass from genetically modified plants like sugar beet (WO 2010076212) and plants with additional enzymes supposed to make it easier for the plants to produce energy (WO 2010091149). When corporations like Monsanto or Syngenta want to have patented soybeans with an enhanced oil content, or sugar beet with an enhanced proportion of sugar, they are striving for control over their utilisation in the production of both food and energy.

Patent applications made with and without genetic engineering playing a role have also been made in the sphere of extracting lignocellulose from trees, grasses and corn. Here too in many cases, its use in food production as well as the production of energy production is aimed to be patented (WO 2010006152, University of Oklahoma, US; WO 2010006338, Rutgers University, US; WO 2010011717, Ceres, Inc., US; WO 2010062240, Swetree Technologies, SE, US; WO 2010068777, University of Florida, US; WO 2010079332, Rothamsted Research Ltd, UK).

Furthermore, even genetically modified fish having an enhanced oil percentage are to be used to obtain fuel (WO 2010059598, Llifuels, Inc., US); or plants grown to produce plastic (WO 2010102217, Metabolix, US). The Japanese Toyota company has applied for patents on plants and their use for energy production (WO 2010131768 and WO 2009009830).

2.5 Animal breeding

Genome data in animal breeding are becoming more and more important, and marketing them is a flourishing line of business. Depending on how they are formulated, the patent applications can involve their statistical evaluation, genetic information, the processes to be selected from, and even the animals (naturally) bearing the relevant genes. Examples of patent applications for the evaluation of genome data to be found are for swine (WO 2009055805, Newsham Choice Genetics, US), poultry (WO 2010012478, Lohmann, DE) and cattle (WO 2010087725, Fronterra; NZ). Their scope is different in each case. The New Zealand dairy, Fronterra, for example, would like to have patented not only the process for selecting the cows, but also the cows, breeding material, cloned animals and milk.

Other patent applications concern the determination of the gender before birth (WO 2010120518, Biocern, US; WO 2010007118, Masterrind, DE; WO 2010088742, University of Melbourne, AU). Some of these applications also claim breeding material such as sperm, oocytes or deep-frozen embryos.

2.6 Food

The research shows that consumers and food manufacturers are especially affected by these current developments. In many cases the patents extend from seed to the processing of food and to oil, flour and protein products. As well as the examples already cited there are patent applications which make claims on wheat and bread, pasta (noodles) and cakes (EP 2183964, Brilla, Italy) or barley and beer (WO 2010063288, Carlsberg, Denmark).

Where vegetables like broccoli, tomatoes, lettuce, melons and cucumber are patented it can always be assumed that food in particular is being claimed. In animal breeding, too, patenting sometimes attempts to at the same time cover not only the cow but its milk too.

Monsanto however plays an exceptional role in the patenting of foods. With genetically modified soybeans as its starting point, the company has applied for special patents on margarine (WO 2010121092) and biscuits (WO 2010124096) in which the oil from soybeans could be used. The corporation also makes claim to meat products such as "sausage, hot dogs, salami, ham, uncooked meat tissue" (WO 2009073397, WO 2009097403), products made with fish and crabs (WO 2009102558, WO 2010027788), and the meat and eggs of poultry (WO 2010107422).

3. Patents granted

The patents granted in 2010 involve in equal measure genetic material, seed, plants and food. They cover plants and animals with and without the use of genetic engineering. The largest proportion of the patents granted (roughly 200) cover genetically modified plants.

Of the big corporations BASF (together with CropDesign, Metanomics and Sungene) accounted for 22 of the patents granted. Monsanto and companies belonging to it were granted 18 patents, Bayer 14, Dupont 12, and Syngenta and Dow AgroSciences was each issued four patents. Further patents also went to corporations through collaborations or via other subsidiary companies.

About a dozen of the patents granted are concerned with breeding processes which don't use genetic engineering. By December 2010 the basic procedures for broccoli and tomatoes (G2/07 and G1/08) had still not been concluded, and other applications should really have been shelved accordingly – but several were nonetheless issued. It is to be feared that even many more of these patents will be granted as from 2011 (see Part 4).

Patents on conventionally-bred livestock occupy a special position. To date relatively few patents extending directly to animals themselves had been granted. It may be that examiners at the European Patent Office are under internal instructions not to grant these patents on account of public criticism of them at this time. In the medium term, however, no differences in patenting between plants and animals should be expected – both groups, according to Article 53b, have the same legal status. So if patents are granted on plants it can be anticipated that animal patents parallel to these will also be granted. 2010 saw the registering of four patents issued which cover livestock and livestock products.

3.1 Genetically modified plants

A series of patents on genetically modified plants which cover the whole of the food production chain were granted in Europe in 2010.

Monsanto obtained patent EP 1444348, which is about the enrichment of certain constituent substances in plants. Those named are "alfalfa, Arabidopsis thaliana, barley, Brassica campestris, Brassica napus, oilseed rape, broccoli, cabbage, canola, citrus, cotton, garlic, oat, allium, flax, an ornamental plant, peanut, pepper, potato, rapeseed, rice, rye, sorghum, strawberry, sugarcane, sugar beet, tomato, wheat, poplar, pine, fir, eucalyptus, apple, lettuce, lentils, grape, banana, tea, turf grasses, sunflower, soybean, chick pea, corn, Phaseolus, crambe, mustard, castor bean, sesame, cottonseed, linseed, safflower, and oil palm" (Claim 22). Genes, plants (and thus plant varieties), seed and animal feed were patented with these plants.

Dupont has also been granted comparable patents in Europe. Patent EP 1208203 is about different genetically modified plants in which the composition of their constituents has been altered. The seed, plants and harvests in the form of oilseed, together with the animal feed in which this seed is mixed, have been patented. Even the feeding was patented. Claim 24 claims a "method of improving the carcass quality of an animal ... with the feed ..."

Similarly, the Bayer company has obtained a patent on genetically modified wheat (EP 1725667). Plant cells, plants, seed and "harvestable plant parts" have been patented (Claim 10).

Patents on genetically modified food have also been granted to big food manufacturers. The Swiss company, Nestle/Nestec, has for example been granted a patent on genetically modified coffee (EP 1904639).

BASF and its subsidiary CropDesign have for some years already recognised climate change and population growth as important areas for future commercial activities. The text of a patent applied for in 2005 and granted in 2010 says, for example, "The ever-increasing world population and the dwindling supply of arable land available for agriculture fuel research towards improving the efficiency of agriculture." (EP 1819822, page 2). In 2010 the companies obtained several far-reaching patents on plants which BASF and CropDesign wanted to open up future markets for. One patent CropDesign thus acquired, patent EP 1819822, claims plants which attain an enhanced yield – regardless of whether this property is based on a genetic modification or a mutation.

The fact that the companies are not proceeding with their genetic "inventions" at all by plan or with well-defined targets can be seen from BASF's newly granted patent, EP 1487255. Here several thousand genes from micro-organisms (including dangerous pathogens) are supposed to be incorporated into the most diverse plants. The biological function of the genes here is often virtually unknown. All possible traits in the plants manipulated by chance in this way are then supposed to be analysed. The patent specifications (page 12) talk of a whole number of biotic and abiotic stressors as well as interactions with the environment. The plant populations with the additional genes, and the processes for producing the transgenic plants, have been patented. The principle of chance has here, so to speak, been officially declared by the European Patent Office to be an invention.

3.2 Conventional breeding

Even though a decision in the precedent-setting broccoli and tomato case (G2/07 and G1/08) was not made until the end of 2010, the EPO already granted other patents on the conventional breeding of plants during the year.

These include, for example, the EP 2002711 patent granted to Syngenta on hybrid breeding of rape. According to the patent rape plants with natural pollen sterility based on mutations are to be used to produce seed.

Consejo Superior de Investigaciones Cientificas in Spain obtained another patent, EP 1689222, on sunflower oil, sunflower seed, seed, plants (conventionally bred), issue from the plants, as well as foodstuff containing the sunflower oil. The way the patent claims are formulated, adding the oil to foods can lead to the entire food likewise coming within the scope of the patent.

Further patents on conventional breeding were granted to the Dutch companies, Nickerson Zwaan (EP 1668979) and Enza Zaden Beheer (EP 2041289), in which onions and cucumber resistant to mildew have been patented.

A Dutch breeder was also granted a patent on orchids (EP 19568869). In this case the plants are not even processed in their cultivation, they are simply treated with a growth-enhancing substance.

3.3 Animal breeding

The Patent Office granted two patents on the selection of cattle based on genome data. One process is concerned with belonging to certain breeds or populations of cattle (EP 1649058), others with enhanced milk yields (EP 1633889).

In another case the milk of cows kept under special licensing terms has been patented in order to enhance the concentrations of certain substances (melatonin) in the milk (EP 18841325). The Patent Office furthermore granted a patent on fish treated with growth-enhancing hormones (EP 1846562). According to the wording of the patent, which was granted to the University of Leiden in Belgium, hormone-producing cells have been implanted in the fish.

4. Legal appraisal and conclusions

Two important decisions were taken in 2010 as regards the patentability of conventional breeding of plants and animals. In one the European Patent Office Enlarged Board of Appeal decided that methods for the conventional breeding of plants could not be patented (G2/07 and G1/08). In the other the EPO Board of Appeal decided already in May 2010, in the case of a patent on sunflowers granted to Consejo Superior de Investigaciones Cientificas in Spain (EP 1185161), that even in cases in which breeding methods are not able to be patented, conventionally-raised sunflowers, their seed and sunflower oil can be patented (T1854/07).

As an analysis of the EPO's examination reports shows, even after the decision on the broccoli the Office has been pursuing the line prescribed in the decision on the sunflower patent. In November 2010 already, in the case of patent application EP 1793661, the Biogemma company, which had made a patent application for corn, was sent an examination report in which only the claims to the breeding processes were deleted. The corn itself, however, can be patented. The Office on 17 January 2011 sent a similar notification to the Seminis company, a Mondanto subsidiary. It wants a patent for breeding tomatoes without cores (or with less of a core) (EP 1026942). Referring to the decision in the broccoli case the Office notified the company that the breeding process could not be patented but the plants and fruit of the tomatoes could be.

This ban on patenting "essentially biological processes for the production of plants or animals" enshrined in EU Directive 98/44 and the European Patent Convention is being interpreted by the European Patent Office in such a way that processes for conventional breeding cannot be patented, but the products (plants, animals, seed, breeding material, and the products of harvests and food) certainly can. The ban is in this way virtually removed. When only the claims on processes are deleted in patents, their scope is hardly restricted at all. The ban thus loses the effect actually intended by the law makers. The ban on patenting plant or animal varieties set down in Directive 98/44 and the European Patent Convention has similarly been made void. Here the Patent Office had already decided in 1999 (G1/98) that patents can always be granted if claims are not made directly for particular varieties but generally for plants with certain characteristics. Since then all objections to the patenting of plant varieties have been rejected – even in cases in which plant varieties have been proven to be covered by the patent.

This development has been followed with concern in many quarters, especially in Germany. According to its government programme the German government rejects patents on plants and

animals. This position was again made clear at a conference in Brussels in September 2010.¹ MPs of all parties in January published a public statement calling for changes in the law in order to prevent decisions like that in the sunflower case.² A number of institutions in the Catholic church likewise spoke out in opposition to patents on plants and animals in January 2011³, as has the ABL farmers' association, the BDM German dairy farmers's federation and the German farmers' federation, the Deutsche Bauernverband. But clear signals are also coming from the German federation of plant breeders, the BDP: the European Patent Office must in future exclude from patentability not only processes for breeding but also the plants themselves.⁴ The developments in patenting are being followed with concern not just in Germany. A study at the university of Wageningen in the Netherlands, for example, warns of a sellout of European breeding companies.⁵ In 2009 the UN Special Rapporteur on the right to food, Olivier de Schutter, publicly denounced the fact that the supply of seed and food was globally becoming more and more under the control of international corporations.⁶ In Europe and beyond many agricultural organisations support the demands of the No Patents on Seeds alliance. Calls for action in line with its demands have been signed by big farmers' organisations in Switzerland, Italy, Spain and elsewhere.

Given this background, the founders of the No Patents on Seeds initiative, which is supported by over 300 organisations (see www.no-patents-on-seeds.org), are calling for clear and unmistakable bans in European patent law, particularly on the patenting of breeding methods, breeding material, and plants and animals and food obtained from them.

¹ <http://www.bmelv.de/SharedDocs/Standardartikel/Landwirtschaft/Tier/Tierhaltung/BiopatenteHintergrund.html>

² http://www.keinpatent.de/uploads/media/11_Erklaerung_zu_Keine_Patente_auf_konventionell_gezuechtete_Pflanzen_und_Tiere-1.pdf

³ <http://www.zdk.de/reden/reden.php?id=231>

⁴ http://www.bdp-online.de/de/Presse/Aktuelle_Mitteilungen_1/BDP_fordert_Anwendung_der_Brokkolientscheidung/BDP_fordert_konsequente_Auslegung_der_Brokkoli-Entscheidung.pdf

⁵ Louwaars N., Dons H., Overwalle G., Raven H., Arundel A., Eaton D., Nelis, A., 2009, Breeding Business, the future of plant breeding in the light of developments in patent rights and plant breeder's rights, University of Wageningen, CGN Report 2009-14 (EN) CGN Rap, <http://documents.plant.wur.nl/cgn/literature/reports/BreedingBusiness.pdf>

⁶ <http://www2.ohchr.org/english/issues/food/index.htm>