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'Though the treasure of nature's germens tumble all together': the EPO and patents on native traits or the bewitching powers of ideologies

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The growing criticism of patentability of native traits and genes (of plants obtained by traditional cross-breeding methods of species with the use of molecular biology methods) prompts questions about the constant erosion of boundaries in the field of non-patentability, which has been denounced by authoritative legal writers. But the issue currently at stake is even more worrisome, insofar as these new patents, the volume of which is constantly increasing, are blocking patents and cannot be expected to be circumvented by resort to cross-licensing agreements. Relying on the position expressly adopted by the European Patent Office (EPO) president in the Tomato II case, this paper brings to light the pro-patent bias that affects the functioning of the European patent system. It shows that this troubling phenomenon is rooted in governance issues. Above all, it stresses a deeper factor, namely the dual ideology of an exchange society and of science and technology (the logic of progress) that has dramatically severed the ties between the EPO and people's representative bodies, multi-stakeholder bodies and citizens themselves.

Introduction

Somewhat neglected by research in intellectual property, plant biotechnology (whether genetically modified or not) still poses key challenges of comparable importance with those encountered in the pharmaceutical field. They are primarily economic: with the progressive shift from a model of governmental direct support for R&D to a model of private research financed by the market (Bonneuil and Demeulenaere, 2007). It has become necessary to set up incentives to spur investment by the private sector. The seed industry is now investing in research activities which total 12–15% of its turnover, a volume comparable with research investment made by the pharmaceutical industry. Overall, the average investment for a research programme in this field is around €2 million. The question remains: how to sustain this massive level of investment and thus to foster innovation in plant breeding? In the future, more than ever, these economic challenges will be closely intertwined with political and social issues. Given the limited nature of arable lands and global population growth which is expected to reach 9.6 billion people by 2050 (Global Harvest Initiative, 2013), as well as the alleged consequences of climate change and environmental threats (Sutton *et al.*, 2013), it might become necessary to expand food productivity and to increase production and output while facing these new constraints (Global Harvest Initiative, 2013).

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Legal systems have not remained unchanged by these economic concerns and socio-political issues as substantiated primarily by the directive 98/44/EC of 6 July 1998 (Biotech Directive) on the legal protection of biotechnological inventions. This excludes plant varieties from patentability, but nevertheless acknowledges the patentability of plants if the technical feasibility of the invention is not confined to a particular plant variety. Admittedly, if plant varieties are still excluded from patentability and protected by Plant Breeder's Right (or the Plant Variety Act),[1] the Biotech Directive has nevertheless enabled the patentability of a great number of biotechnological inventions related to plants: microbiological processes (any process involving or performed upon or producing a microbiological material (e.g. algae, bacteria, fungi, protozoa) and technical or non-essentially biological processes (e.g. genetic engineering processes) (Llewelyn and Adcock, 2006; Girard and Noiville, 2014a), genetically modified crops (in the genetic makeup of which is inserted a foreign DNA under the condition that the technical feasibility of the invention is not confined to a particular plant variety), as well as the sequence or partial sequence of a gene, even if its structure is identical to that of a natural element, provided that the function it performs and its industrial application are disclosed in the patent application (see Van Overwalle, 2011). This change in standpoint has been generated first by the willingness of the EU Commission to remedy the European patent system, seen as deficient in the purpose of fostering the European biotechnology industry (Porter, 2009). At the same time, European policy has been driven by the concern to provide a high level of legal protection for European companies so that they could remain competitive with American and Japanese companies (Schneider, 2009a). Likewise, the Directive demonstrates the willingness to bring European legislation into line with the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement, 1994), Article 27(1) (*Patentable Subject Matter*), which stipulates that 'patents shall be available for any inventions, whether products or processes, in all fields of technology'. Finally, the adoption and the contents of the Directive can be interpreted as an effort by the UE to take into account and face, at least with regard to plant biotechnology (Biotech Directive, recital 10), the challenges of sustainable development and climate change.

Of course, nothing would have changed without the development, in the wake of modern biotechnology dating back to the 1980s, of modern techniques of plant breeding [these include essentially molecular marker-assisted selection and transgenesis (ISAAA, 2014)]; on the most recently described techniques, which are beyond the scope of this paper, see Lusser *et al.* (2012). These techniques, based on the identification and selection of genes responsible for the desired trait, have become more and more specific. This phenomenon has so thrived that it has allowed breeders to produce new plant varieties and develop them faster with given traits. Importantly, these new techniques have enabled the spread of genetic plant creations. Since a genetic code is generally universal, it has also become possible to introgress the designated gene and then to have it duplicated in a wide range of plant varieties. Thus developed, this innovation encompasses an indefinite number of individual entities defined by a portion of their genotype or by a new characteristic (for example, tolerance to biotic or abiotic stresses, and resistance to insects or herbicide). Since the 1980s, major players in the seed industry have quite understandably attempted to protect an invention capable of being incorporated into a multitude of varieties, rather than a particular plant variety – which the European Patent Office has finally accepted, though not without resistance (Llewellyn and Adcock, 2006).

Finally, these new tools of plant breeding have themselves resulted in a reconfiguration of the plant breeding sector, long marked by a large number of companies worldwide and a very low concentration in fragmented markets composed of small and medium sized enterprises (SMEs). The first change occurred in the 1970s: companies from the petrochemical, agrochemical and pharmaceutical sectors saw in biotechnologies a promising surrogate for research in fossil fuel fields, and thus invested heavily in agricultural biotechnology. Over the next decade, a merger and acquisition wave led to a high concentration of firms in the breeding sector. Today, these seed companies from agrochemicals (Monsanto, DuPont, Syngenta, Bayer, Dow, BASF) dominate the market (Howard, 2009). For instance, the three biggest multinationals constitute an oligopoly controlling more than 47% of the global seed market (ETC Group, 2008; De Schutter, 2011). All the companies that have become accustomed to protecting their innovations through patents have praised this legal tool in biotechnology.

This development pathway of patent law, so natural in all sectors of innovation for ideological reasons that will be addressed later in this paper, has provoked strong reactions and met with resistance in the field of plant breeding. Since the 1950s, which marked the beginning of the development of a specific legal mechanism for plant varieties (Breeder's Right), it has become widely recognised in Europe that seeds are not just another consumer commodity. On top of the fact that plant varieties are difficult to define within the patent law system (Burk, 1991; Bernhardt, 2005), they are a vital link in the food chain. Accordingly, genetic progress made through plant breeding is an integral part of food policy. Plant germplasm also forms the raw material of agricultural activity, and above all the raw material for breeders themselves. Breeders cannot be expected to develop new varieties without broad access to wild and cultivated varieties, since in this area more than any other the innovation process is incremental and 'free access to genetic material is considered as an absolute requirement of plant breeding' (Hermitte, 1990).

Not only has the plant breeding sector been undermined by the advent of the patent system, but its very existence is now threatened by the comprehensive approach adopted by the European Patent Office (EPO) in the field of the patentability of plants. For the sake of simplicity and because the real issue is to be found elsewhere, it suffices to note the following points. It is indisputable that the EPO has responded reasonably to the excessive claims of some companies that intended to patent what is merely a traditional form of plant breeding. In two recent cases, known as 'Tomatoes I' and 'Broccoli I', the Enlarged Board of Appeal had to say whether a non-biological process which consists of steps of sexually crossing the whole genomes of plants and of subsequently selecting the hybrids by the technique of marker-assisted selection (in order, for instance, to select the gene responsible for anti-carcinogenic properties) was patentable (Bostyn, 2009; Hubel, 2011). Holding that such a process is in principle excluded from patentability as being 'essentially biological' within the meaning of Article 53(b) EPC, and that it does not escape the exclusion of the Article 53(b) EPC 'merely because it contains, as a further step or as part of any of the steps of crossing and selection, a step of a technical nature which serves to enable or assist the performance of the steps of sexually crossing the whole genomes of plants or of subsequently selecting plants', the Enlarged Board of Appeal has reassured the great bulk of plant breeders.

Unfortunately, no comparable restriction can be found in the field of patentability of products. Patent applications are usually drafted very broadly to cover, for example, not only isolated and decrypted genetic sequences, but also all DNA sequences found in other plants and having the same structure and the same function. This type of claim is quite common since the major biotechnology companies have launched a vast programme of identification and patenting of 'climate genes', that is, '"climate-proof" genetic traits associated with resistance to abiotic stresses' (ETC Group, 2010). For instance, it is well known that DuPont (Pioneer Hi-Bred) and BASF use the fact that there is similarity in DNA sequences between individuals within the same species or among different species (homologous sequences), and claim not only genetic sequences found in rice or corn that confer tolerance to abiotic stress (drought, heat, cold, salinity, etc.), but also all plants with this similar gene (ETC Group, 2010; Lightbourne, 2012).

These recent developments are of great concern (European Parliament and STOA, 2006; Girard and Noiville, 2014b). But this is as nothing compared with the trend observed in the EPO to grant patents on so-called 'native' genes and traits. These last two concepts require clarification that will be given in due time, but it is worth noting from the outset that they are closely linked to major research programmes of plant genomics (DNA sequencing, transcriptome, metabolome) and to modern techniques used to assist 'conventional' breeding methods (such as molecular marker technology, high throughput analysis), and that they allow the identification of the desired characteristics (e.g. agronomic yield, resistance), their description and their introgression through repeated backcrosses. As a result, it is no longer necessary to resort to genetically engineered (transgenic) organisms (Girard and Noiville, 2014a). In practice, with these new technologies at hand, many corporations from the seed sector claim with the patent, not so much an isolated sequence of a gene, or the resulting transgenic crops, or the microbiological process for their development, but rather some plants or group of plants with particular phenotypic characteristics (taste, resilience in the face of pathogens, etc.). The said plants are obtained by traditional cross-breeding methods of species, the only difference being that the species are selected through molecular biology methods based on the detection of phenotypic characteristics associated with the desired genetic markers.

Statistics recently published by the EPO show that between 1990 and 2008, the institution published 13,484 plant-related applications and granted European patents to 1,690. Among these, 88 of the cases were related to non-GM plants (Girard and Noiville, 2014a). This may seem insignificant, but this number is meaningful in the light of the issues at stake in terms of intellectual and economic access to genetic variability. 'Intellectual access' describes the extent to which a plant variety right acknowledges for every breeder, in the form of a breeder's exemption, the right to use – without infringement – a plant variety protected by breeder's right for the purpose of breeding other varieties [UPOV Convention 1991, Art. 15(1)(iii)]. In addition to intellectual access, the plant breeder's right also provides 'economic access', since every breeder can also, in accordance with the principle of independence, protect and exploit the variety obtained without the consent of the initial breeder. As some plant innovations are now eligible for patent protection, open and free economic access to genetic variability is no longer guaranteed. But these new patents regarding native genes and traits threaten intellectual access directly, which forms the backbone of the plant variety system and is the benchmark of varietal innovation in Europe (ISF, 2012).

This can be measured through two patents recently granted by the EPO: the first, the patent EP 1931193, issued to Enza Zaden Beheer B.V. on 27 February 2013 on a 'method for providing cucumber fruits with an extended shelf life'; the second, the patent EP 2140023, granted to Syngenta on 8 August 2013, on an 'insect resistant plant'. The interest in these patents lies in the debate that accompanies them, especially the discussion surrounding the patent issued to Syngenta on an insect-resistant pepper plant (EP 2140023: Insect Resistant Plant), which led a vast coalition consisting of 34 non-government organisations (NGOs), farmers' and breeders' organisations from 27 European countries to file opposition before the EPO on 3 February 2014 (Erklärung von Bern, 2014). This process has been seen as the emergence of citizen-initiated opposition proceedings (Cassier, 2009). It reflects an awakening of public consciousness about the patentability of living organisms. But current events around the patentability of native genes and traits have greater significance, as confirmed by the numerous *amicus curiae* briefs introduced in the referral of the Tomato case,[2] and by the opposition proceedings brought against a number of comparable patents exposed by the No Patents on Seeds (2013) association. This is not to say that the EPO is unwilling to listen to these protests. In the Broccoli case as in the Tomato case, the Technical Board of Appeal agreed that questions should be referred to the Enlarged Board of Appeal to clarify whether the exclusion of essentially biological processes for the production of plants may affect the allowability of product claims concerning plants or plant material. The president of the European Patent Office has also decided that all substantive proceedings before the EPO first-instance departments depending entirely upon the outcome in the Tomato and Broccoli cases will be stayed *ex officio* until the Enlarged Board of Appeal issues its decisions (EPO, 2014).

These reactions, probably attributable to the increasing intensity of public debate, raise a problem of a new kind. It is indisputable that patent governance is at stake, as highlighted by numerous scholarly studies (Drahos, 1999; Borras, 2006; Schneider, 2009a). Nevertheless, this set of strong and unanimous reactions has led to speculation, beyond the issue of governance, about the ideological underpinnings of European patent law (to mention only this system) and its position within the public sphere (in the Habermasian sense). This paper argues that if the ties have been severed between the EPO and people's representative bodies, between multi-stakeholder bodies and citizens themselves (acting through associations or NGOs, for instance), it is because practical questions arising from 'the process of democratic decision-making' (Habermas, 1989, pp.252–53) have been neglected in the name of the technocratic rationality that stems from market logic and the logic of progress (in relation to science and technology). These market and techno-scientific ideologies can be tackled only by restoring language to its rightful place in society, by creating the conditions for a genuine debate (Habermas, 1989). In subsequent sections of this paper, such public reactions will be explained around issues related to patentability of plant biotechnology and why they have become so widespread. In order to prove this, the core problem – the patentability of native traits and genes – needs to be scrutinised. The reasons leading to such a state of affairs (the rationale behind the patentability of these genes) will then be investigated. Does this predicament of patentability result from problems with governance issues and/or the action of ideologies?

The problem: patents on native traits or genes

Since the 2000s, there has been a proliferation of product claims directed to plants or plant material obtained by traditional cross-breeding methods. This is a major change in the area of commercial claims that should lead to the inspection of the results of studies conducted by jurists and economists. With the arrival of new patents on native traits and genes, it is not only the phenomenon of constraints on intellectual access that is a contentious issue, but also the new phenomenon of enclosure.

A growing number of patents

As we have already noted, the change of strategy by the seed industry is partly attributable to changes that have taken place in the field of biotechnology and genetic engineering. Furthermore, the seed industry has recently sought to take further advantage of the work it has carried out in conventional breeding, rather than in transgenics, the latter being expensive (especially because of the cost of regulation), technically complex (Crolly, 2004; Girard and Noiville, 2014a; Janis *et al.*, 2014), and generally disputed by Europeans. Given these developments, many breeders have sought patent protection for plants expressing a given trait (melons which taste both sweet and sour, tomatoes with a lower water content, aphid-resistant lettuce, sunflowers enriched with fatty acids). This 'trait' does not depend on the insertion of a transgene, but is associated with the expression of alleles from one or more genes deemed 'native'. In a recent report, the French High Council of Biotechnologies (HCB) developed the two following definitions:

> A native trait means 'a trait of any kind, whether physical or chemical, the expression of which is likely to be observed in any plant, wild ecotype or cultivar of a plant species or of a sexually-compatible species (including through embryo rescue), and can be recombined by sexual crossing (with or without the use of DNA markers). A trait that results or may result from random mutation(s) of genes responsible for the expression of a native trait remains a native trait'.
>
> As for native gene (allele), it may be defined as 'a non-scientific term which refers to any gene (allele) part of the gene pool of the target species or species interbreeding with (including through embryo rescue), and including wild ecotypes and cultivars, which may be a product from another native gene (allele) as a result of random mutation events, and can be introduced into a variety of the species by sexual crossing (with or without the use of DNA markers)'. (Girard and Noiville, 2014a, p.177)

These definitions reflect the multinational seed companies' shift toward traditional plant breeding methods. All patents identified by the High Council of Biotechnologies reveal the same methods – successive backcrosses with a wild plant that contains the resistance gene (the native gene), the process being facilitated (and therefore accelerated) by the use of genetic markers. The resistance trait identified in the wild plant gene and the original gene are neither isolated nor described. These patents define the trait only by reference to specific DNA markers (Girard and Noiville, 2014a, p.177). Several particularly significant patents deserve mentioning. For example, the patent EP 1962578, owned by Monsanto and effective since 2011 on some Closterovirus-resistant melon plants; the said plants having been made resistant by the introduction of a gene from another melon plant by way of a traditional breeding method involving the use of genetic markers. The first claim shows that the method used is an introgression commonly used in conventional breeding. It consists of selecting a closely related species having a trait that could not be found in the species to be improved. The patent covers the plant, parts of the plant, and its fruits and seeds. Another example is provided by the patent on the *cucumis melo*, issued to Syngenta in August 2008. Again, the plant was obtained by way of a traditional breeding method.

The picture would not be complete without mentioning two more patents emblematic of this trend towards the patentability of native traits. The first was granted to Rijk Zwaan in 2004 on a lettuce plant resistant to the aphid *Nasonovia ribisnigri*. The trait conferring this resistance has been identified in the wild *Lactuca* variety, and was found to be caused by a single dominant gene, the Nr Gene. The Dutch company, which was not the first to identify resistance, was nevertheless granted the patent on this trait – a trait obtained by way of an essentially biological method – because it claimed to have broken the link between the Nr trait and an agronomically undesired phenotype (white older leaves and/or reduced plant height) called 'compact growth and rapid ageing' (CRA phenotype). This, according to the inventor, was systematically associated with the desired trait (Nr) (Girard and Noiville, 2013). The second is the patent recently granted to Syngenta on novel pepper plants (and seeds and fruits of pepper plants) resistant to white fly (*Bemisia tabaci*) and various thrips species. Once more, the claimed plant was produced by crossing a wild pepper (*Capiscuum*) plant from Jamaica with commercially grown pepper plants. By reading the description, it is understood that the inventor has identified markers associated with the desirable trait (*Bemisia* or Thrips-resistance), and then applied the introgression technique to transfer a Quantitative Trait Loci (QTL) from the wild *Capsicum* known to have this trait to cultivated *Capsicum*.

Towards new forms of enclosure

This latter patent has been strongly opposed by civil society. In addition to opposition proceedings lodged before the EPO by a coalition of 34 NGOs, farmers' and breeders' organisations, two third-party observations have been submitted to the patent office by members of the public strongly opposed to the patentability of the plants thus obtained.[3] It is thus impossible to turn a blind eye to the public response provoked by the Tomato and Broccoli cases. In the case of the Broccoli case alone, more than 30 *amicus* briefs have been filed since the interlocutory decision of the Board of Appeal.[4] To be sure, some of the briefs are in favour of the patentability of native traits, such as those filed by representative bodies of the seed science industry (CropLife International, 2012; European Crop Protection Association, 2012) or by representative bodies of intellectual property attorneys (CIPA, 2012; FICPI, 2012), to which must be added the position expressly adopted by the EPO president (Battistelli, 2012).

Although significant, all these *amicus curiae* briefs do little to mask the strong protest of not only organisations in close proximity with farmers and traditional seed producers (No Patents on Seeds, 2013), but also of some powerful representative bodies of the seed industry, such as the *Union Française des Semenciers* (UFS), Plantum and the European Seed Association. Finally, there is the position expressed by the French High Council for Biotechnology (Girard and Noiville, 2014a) – an independent administrative authority set up by the Ministries of Ecology, Agriculture, Health and Consumer Affairs – and, above all, by the European Parliament whose motion for a resolution 'on the patenting of essential biological processes' (European Parliament, 2012) was recently recalled by an *amicus curiae* brief written by four German members of the European parliament. This strong position is echoed by the recommendation of the French Economic, Ethical and Social Council (CEES) of the HCB, released on 12 June 2013 and calling for, as an extension to an earlier position paper issued by UFS (2011), the exclusion from patentability of genes (alleles) and native traits, as well as plants derived from essentially biological processes (Girard and Noiville, 2014a, p.41; French Senate, 2014). Finally, in the wake of the German Bundestag resolution entitled ‘No patenting of conventionally bred livestock and plants’ (Bundestag, 2012), Germany was the first country to take action by incorporating in its *Patent Gesetz* a new provision [§2a(1)1] according to which essentially biological breeding methods and animals and plants exclusively obtained by such methods can no longer be patented.

All these public statements (and henceforth legislative intervention) are converging towards an opposition in principle to the patentability of plants defined by one or more specific phenotypic traits, these plants having been produced from a biological process of plant breeding excluded from patentability in accordance with Article 53 (b) EPC. Of all the claims made by the opponents, the most significant is that eligibility for patent protection should be reserved for inventions deemed to be novel and implying an inventive step. On no account should the patentability extend to matters on which human technical intervention achieves no impact over the product claimed. This means that those characteristics that cannot be eligible for patent are the phenotypic traits of plants, when the traits are naturally present (in an individual of a given species or a closely-related species), and recombined in a given plant by way of sexual crossing (whether or not with use of DNA markers), or obtained by way of traditional breeding methods. Plants claimed herein are nothing more than the product of a process from non-patentable common knowledge (Tomatoes II, reason 42). In other words, as relating to the ‘fundamental principles of knowledge’ (Dinwoodie and Dreyfus, 2006), these plants pertain to, and must be maintained within, the so-called ‘domain of accessible knowledge’ (Gollin, 2008).

Second, and as defined by a Dutch decision (Cockbain and Sterckx, 2012) in a case analogous to those decided by the Enlarged Board of Appeal in the Tomato and Broccoli cases,

> it is plausible that under [art.53(b) EPC] not only an essentially biological method is unpatentable, such as ‘classical breeding’ in this case, but also a product directly obtained by using that method, because a method claim also protects the product directly obtained using that method (see [art.64(2) EPC]). If it were to be ruled that a product-by-process claim is admissible for the directly obtained product of an unpatentable essentially biological method, that would render the exclusion in [art.53(b) EPC] as interpreted by the [EBoA] in G1/08 pointless …. (Taste of Nature v Cresco, 2012)

Put succinctly, allowing the patentability of a product obtained by way of an essentially biological process would render the exclusion enshrined in Article 53(b) EPC null and void. Lastly, admitting the allowability of product claims directed to plants obtained through essentially biological processes on the grounds that the plants are not ‘plant varieties’ as such, ignores the spirit of the EPC which, through Article 53 (b), sought to exclude from the scope of patents not only the plant varieties within the meaning of the UPOV Convention, but all plants obtained by way of essentially biological processes (*cf.* Pila, 2005; Sterckx and Cockbain, 2012).

Finally, and above all, seeds are not just another consumer commodity. In this field, more than any other, innovation is a cumulative process; nothing has been created from scratch since no new variety is bred or developed without using previously selected varieties. The guarantee of free access to genetic heritage (understood as a common pool of resources) is thus an essential component of breeders' activities and breeders have always stressed the need for access to the whole range of existing genetic diversity (Louwaars *et al.*, 2009; UFS, 2011). This is precisely why a *sui generis* legal mechanism – the Plant Breeder's Right – has been laid down, incorporating in addition to exclusive control over the propagating material and harvested material of a new plant variety, the principle of *economic* and *intellectual* free access. Through what is called the 'breeder's exemption' in plant variety acts, germplasm sources remain accessible to all the breeder community. And thus this exemption acts as more than just a research exception. Every breeder is not only allowed freely to use a protected variety as a basis for a new variation, but can also apply for a plant variety right and, once granted, market the new variety.

The patentability of plants produced by essentially biological processes could possibly upset the balance of the legal regime that has been achieved in the field of plant innovation. Patent law does not include any breeder exemption, but only a research exception (see Waltz, 2009). Even if the exception is sometimes interpreted broadly (Strauss, 2002, p.8) and even if there are countries (Prifti, 2013) where an exemption for breeding purposes has been introduced into patent law, breeders are allowed to use patented biological material only for breeding purpose, not for commercialising the variety developed (ISF, 2012, para. 2.4.2). If they wish to exploit their work, they must request authorisation from the patent holder, who is thus in a position to require payment of significant royalties, or to refuse (Kloppenburg, 2013). That is the reason why there is an ongoing debate in the Netherlands, initiated by Plantum (the Dutch association of plant breeders), around the opportunity to set up a comprehensive breeder's exemption (as opposed to the limited breeding exemptions that have just been mentioned), thereby vesting the breeders with the right to commercialise a plant variety regardless of whether it contains a patented technology (Prifti, 2013; Girard and Noiville, 2014a).

As the law currently stands, the proliferation of patents on plants with specific phenotypic traits is likely to lead to the slowdown of the innovative process since the recombination of native traits is the basis of breeding activities. Irrespective of the method used to obtain a phenotypic trait, its results will fall under the scope of the patent claims. What is more, patents on native traits or genes hamper this innovative process much more than those covering isolated DNA sequences or transgenic plants. In the latter cases (DNA sequences/transgenic plants), what is patented is either an isolated gene,[5] or the plant itself as modified by the introgressed gene. Breeders and farmers can thus expect a reasonable amount of freedom for their operations; for instance, by removing the resistance gene, though this is not possible in the case of stacked genes or when the genetic material is in the cytoplasm (Girard and Noiville, 2014a).

In any event, things are much more complex when the subject matter of the patent is an individual plant or a group of plants with a native trait that has not been described in the scientific literature. The gene is thus naturally present in the varieties exploited by breeders, these varieties falling automatically within the scope of the patent. The situation is even more critical, given that all varieties of a given species share the same genes (with some allelic variations). Even different species can have the same genes (with, in addition to allelic variations, a different distribution of genes in the genome) (Girard and Noiville, 2014a). Hence, 'the trait associated with the expression of a given allele gene is susceptible to its application relating to at least all varieties of a species, and even those of other species' (Girard and Noiville, 2014b, p.87). There is for plant breeders little prospect of a definite move towards further freedom to operate by resorting to licensing strategies. It is no exaggeration to say that what is at stake, concerning patents on native traits and essentially biological processes, is the compromise which has become typical of the European legislation since the 1960s between the public interest in accessing new knowledge and the public interest in promoting invention and creation (European Parliament and STOA, 2006), and thus the very activity of varietal innovation.

The rationale: governance issues and ideologies

In recent decades, the EPO has tended to reduce the scope of exclusions from patentability enshrined in the EPC (Sterckx and Cockbain, 2012). In the field under consideration, this reduction was achieved through an authoritative ('authentic') interpretation carried out by the judicial (or quasi-judicial) bodies of the EPO, except for those issues that were settled by amendment to the Implementing Regulations to the European Patent Convention. For instance, the EPO committed to implement the Biotechnology Directive into its own legal order and did this by introducing new rules that came into force in September 1999.[6] The reason for this continuous expansion of the boundaries of patentability lies in a pro-patent bias, a bias in the form of 'juridical arguments and theories that have enabled applicants for biotech patents to overcome existing bars' (Drahos, 1999, p.443). There are two underlying factors behind this continuous expansion of the boundaries of patentability: problems that relate to systems of governance, and the influence of specific ideologies. These interests (in a Habermas sense) have led to the degradation of the public sphere and thus to systematically promoting the views of the patent community (see Habermas, 1990).

The pro-patent bias: the EPO and its control over exclusions from patentability

It is quite well established by legal scholarship, in the light of an in-depth appraisal of a substantial body of decisions, that the EPO has been affected by a pro-patent bias (see Sterckx and Cockbain, 2012). For instance, in the Plant Genetic Systems case, it was stated clearly and precisely that 'the concept of patentability in the European patent law must be as wide as possible'. As pointed out by Drahos (1999), this has led to a conclusion 'that serves as a foundational interpretative assumption for European patent law … exceptions to patentability have to be narrowly construed'. An overview of the traditional rhetoric arguments at work can arguably be seen through this evocation of strict construction; but this perspective must be enlarged so that the whole ongoing strategy at the EPO level can be contemplated. In this respect, it seems highly appropriate to rely on the comments of the president of the EPO submitted to the Enlarged Board of Appeal in the case Tomato II (Battistelli, 2012). They are symptomatic of the pro-patent institutional stance adopted by the EPO in past decades. First, though, the issue at stake before the Enlarged Board needs to be reiterated: the question is whether, by excluding essentially biological processes from patentability, the drafters of Art. 53 (b) EPC intended to exclude, at one and the same time, the product of these processes. Nothing in the official records gives grounds to believe that the decision should be against or in favour of the patentability (Bostyn, 2013), which leaves room for judicial interpretation. But it should be clear from the outset that the issue lies not so much in the answers that could be given from a legal standpoint, but in the manner in which legal arguments and traditional canons and rules of legal interpretation are commonly advanced by EPO bodies to advocate and support pro-patent options.

The first argument is technical and draws on a set of legal arguments and interpretative techniques mobilised to weaken the opposing views that could be exhibited, or relied upon, to narrow the allowability of patents. It can be, for instance, the principle of separation between aspects of patentability and extent of protection (the latter normally falling within the competence of member states) (see Battistelli, 2012). Part of the strategy can also consist of challenging the previous decisions likely to contradict the pro-patent options, even though this might lead to a serious disregard for the main features of the doctrine of precedent. For instance, the Ciba Geigy case, which denies patent protection for product claims for plants produced by an essentially biological process, was disregarded on the grounds that it was *obiter dictum* (and so of no binding effect) on this matter, and that it would have been overruled (Battistelli, 2012, no.14, p.8). And yet, on close examination these findings are questionable: as admitted by the president himself, 'the Enlarged Board of Appeal was not called upon to decide the specific question of interplay between patentability and extent of protection at issue here'.

The second argument is related to policy considerations that underestimate the potential role and freedom of the EPO's judicial bodies. Once again, the comments by the president are paradigmatic, especially when he contends that the 'role attributed to the EPO by the legislator … cannot be disregarded': the judiciary is in charge of interpreting the law and in no way shall it create the law, which is the sole prerogative of the legislative power (Battistelli, 2012). In other words, those who have felt unsatisfied with the current legal framework have called for legislative intervention (Battistelli, 2012; Bostyn, 2013; *contra*, Schneider, 2009a). Without discussing for the moment the relevance of the argument according to which a clear dividing line would be drawn between legal construction and creation, the judge is certainly more than the mouth that pronounces the words of the law (see Eskridge, 1990; Gadamer, 2004, p.324). Reasons based on the principle of separation of powers seem rather incongruous, given the thoughtlessness with which the issue has been settled in the past few years. When the Biotechnology Directive was incorporated into the EPC, the decision was made to take action by way of a Decision of the Administrative Council of the EPO, whereas the importance of the changes should have required the convening of a Diplomatic Conference. By the same token, when the EBoA was called upon in the Transgenic Plant/Novartis II case to determine whether a claim that encompasses plant varieties but does not individually claim specific varieties escapes exclusion, it did not have the slightest qualm about relying on the EPC's Implementing Regulation and thus on the Biotechnology Directive, 'while overruling a previous decision of the Enlarged Board of Appeal' (Schneider, 2009a, p.624).

There is a lot more that needs to be said, especially about the legal inconsistencies that these patents on native traits are likely to introduce in the EPC (see Bostyn, 2013). But it is necessary to dwell on another aspect of the policy considerations: what is the primary and fundamental mission of a body vested with judicial or quasi-judicial powers? It could be argued that, at the very least, judicial bodies have 'to be in accord with the "legal idea" in mediating it with present', which means that they have to adapt the law 'to the needs of the present', thus 'seeking to perform a practical task' (Gadamer, 2004, p.324). The term 'legal idea' may be understood as an invitation that might appear somewhat counterintuitive to the jurist – not to seek for the truth of a provision by looking only at the text or the legislative expectations. Any person endowed with quasi-judicial/judicial powers should always explore the *telos* of the set of rules in which lies the provision, the purpose mediated by historical tradition as it appears in the light of present-day conditions (Eskridge, 1990). If we set aside, for the moment, the concepts of morality and *ordre public*, which perform a gatekeeping function in regard to inventions whose exploitation would be contrary to the basic values enshrined in the legal order of the contracting states and instead allow 'for innovation to be qualified in terms of efficiency, sustainability and social desirability' (Schneider, 2014), what constitutes the real *telos* of the patent system? The matter is still being hotly debated, but there is general agreement today that the patent system (as well as the plant breeder's right system) is grounded in a twofold utilitarian argument: (i) without the prospects of an exclusionary right on the invention (the entitlement guaranteeing a return on investment), potential innovators would not have any impetus for innovation and there would be too few innovations and inventions; and (ii) without the prospects of an exclusive right to use the invention, innovators, who may fear being deprived of the economic value of their inventions, would naturally be prone to keep their creations secret instead of disclosing them (Sterckx and Cockbain, 2012). From a purposive perspective (*telos*), the argument can be summed up as follows: '[…] the patent system is said to promote the dissemination of technological information, which encourages technological progress, which in turn enables economic growth' (Sterckx and Cockbain, 2012, p.11; see also Landes and Posner, 2003; Gollin, 2008).

At the very least, judicial bodies in charge of the patent system should keep in mind its claimed purpose and base their interpretive reasoning on the supposition that any conclusion that is likely to bring down a consistent normative system must be rejected on the ground that it cannot conform with its institutional history taken as a whole (Dworkin, 1977). But what is at stake today is the very existence of the patent system as an incentive for innovation in plant breeding. Any decision endorsing the patentability of native traits and genes would only further exacerbate the current predicament of the seed industry. It is worth recalling, first of all, that a long development period is needed before a new variety can be released (approximately 15 years for annual crops), even though new technologies have reduced the time period significantly. Likewise, the required level of knowledge is increasingly high, especially when it comes to the main arable crops and vegetables. Eventually, there cannot be any hope of innovation without broad access to genetic resources and enabling technologies (Louwaars *et al.*, 2009). Two options are normally available to the breeder – resorting to the biological material stored in gene banks, or breeding the plant variety from a modern advanced variety. If germplasm is freely available, the breeder 'needs an extra long development time in comparison with modern advanced varieties' (Louwaars *et al.*, 2009). If germplasm is not freely available insofar as it falls under patent rights, transaction costs may be increased, including 'legal fees for searching and filing patents and expenses for negotiating a drafting licence'. Besides, royalties must be paid for using another's technology. This rent to use patented technology can be at a very high rate (Graff *et al.*, 2004), especially when the potential licensee cannot claim a licence as part of a cross-licensing agreement.

The real problem thus lies in concluding cross-licensing agreements. If some agreements have been concluded for the development of transgenic plants, it is worth noting that they were negotiated among major players only (COGEM, 2009). The reason is that cross-licensing strategies, unlike what happens with operators that are endowed with significant market power and large industrial property rights portfolios (Graff and Zilberman, 2001; van Overwalle, 2009; Louwaars *et al.*, 2009; Howard, 2009), work inefficiently on the seed market characterised by operators of a different size and scale, and which generate significantly lower profits (Girard and Noiville, 2014a). Accordingly, small players in the market have to pay premium price (Girard and Noiville, 2013). In this respect, '[o]ne industry estimate put the costs of negotiating a single crop genetics deal as high as $100,000' (Graff *et al.*, 2004). Obviously, in the case of 'stacked' varieties – embodying many patented genetic technologies – the problem is compounded (see COGEM, 2009). Rather than incur these costs, many SMEs prefer to work around IPR; they identify alternative ways to do the same thing and to yield the same benefits (Baumgartner, 2006). It could be argued that these constraints on the innovative process are an integral part of the normal functioning of the patent system as conceived in the capitalist model. Innovation is a 'perennial gale of creative destruction' which opens up new markets, be they domestic or foreign, and revolutionises economic structures, 'incessantly destroying the old one, incessantly creating a new one' (Schumpeter, 1976). Companies that do not manage to innovate or fail to invent around will gradually disappear. That is what Schumpeter called the 'destructive creativity' process.

It should be emphasised that three aggravating factors are impairing the normal functioning of the innovation process and the very possibility of creativity in plant breeding (see Cukier, 2006). First, it is both expensive and time-consuming to identify which plant varieties incorporate which patented technologies. Patent registers do not provide these kinds of data and freedom to operate can be determined only by complex and costly monitoring procedures. Even these may be ineffective because 'the boundaries for a considerable expanse of technological territory are not clearly demarcated, creating considerable uncertainty as to when a new application could be considered to be infringing or "trespassing"' (Graff *et al.*, 2004, p.124). Second, this phenomenon is further amplified by patent strategies, such as poorly drafted patents (Louwaars *et al.*, 2009) or offensive patent portfolios, intended to 'block others from entering the market by creating minefields around a company's technology' (TIP, 2008, p.18; see also Blind *et al.*, 2009; Heller, 2008). Itcomes as no surprise that we have recently been experiencing the development of patent thickets (Heller and Eisenberg, 1998) in plant breeding (Cukier, 2006), described as likely to lead to 'a tragedy of the anti-commons' and, according to some studies, already responsible for the slowdown in innovation for certain crop sectors (Graff *et al.*, 2004; see also Moser and Rhode, 2012; Heald and Chapman, 2012). Lastly, plant breeding is a prime example of innovation systems (Scotchmer, 1991; TIP, 2008, p.15): neither individualistic nor linear, plant breeding is circular and collaborative, innovation begets innovation. It cannot be denied that plant breeding is suited to intellectual property protection: 'elite plant varieties are expensive and time-consuming to produce', while 'once created, they are inexpensive to duplicate' (Janis *et al.*, 2014, no. 1.03). But

> plant breeders work by gaining access to existing germplasm. Plant breeding thus may be said to be a canonical example of sequential innovation, where continued progress may depend on the maintenance of a robust public domain (as some would put it) or at least on a set of carefully articulated and secure carve-outs from intellectual property protection. (Janis *et al.*, 2014, no. 1.03)

Given the risks already threatening plant breeding, it would be reckless to grant patents with as broad a scope as those on native traits and genes. Direct and conclusive evidence of the accuracy of the findings is provided by representatives of the seed industry themselves who have recently revealed a proposal to set up a vegetable seed traits licensing platform under the governance of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA). Developed by a group of vegetable breeding companies and designed to contribute to the Benefit-sharing Fund of the ITPGRFA, the open innovation model is to guide the provision of an online industry licensing platform for patented native vegetable traits (ILP), providing access to patented innovations under the parameter 'free access but not access for free' (ITPGRFA, 2013). But the most valuable part of the proposal lies in the recently released report by the *ad hoc* Advisory Committee on the Funding Strategy of the Treaty (ACFS):

> today, the availability of patents for non-GM traits creates a risk of legal uncertainty, dependency on patent holders, and requires monitoring for patented elements, with litigation and 'innocent infringement' risks. The open innovation model aims to instead provide a transparent, fair, reasonable, non-discriminatory and commonly agreed platform for licensing of patented elements. (ITPGRFA, 2013)

Such a proposal – if it expresses the genuine intentions of the seed industry and is not a convoluted move to deceive competition authorities (see ETC Group, 2013; Girard, 2015) – reflects a greater awareness of the current debate (Kock and Gould, 2013). But it is still unclear why, rather than opposing the patentability of the product of an essentially biological process, the president of the EPO, along with the vegetable breeding companies involved in the ILP, keep supporting pro-patent options.

Governance and ideologies: the degradation of the public sphere

We are faced with a paradox. At one extreme, innovation, which forms in the capitalistic model the backbone of the patent system, is now put at risk by the pro-patent bias that characterises the patent community. At the same time, civil society, acting as whistleblower or alert network, has enabled us to see clearly that there is 'growing sentiment that IP are at least indirectly denying the public some of the … agricultural benefits that … the public rightly deserves, as part of the social contract for which the patent system was established in the first place' (Cukier, 2006, p.249). At the other extreme, none of the arguments brought forward in the foregoing paragraphs appear in the comments by the resident or in the documents released by the ILP project. The explanation must be sought in the governance of the EPPO and in the justification underpinning the current position of the EPO.

On the whole, the EPO has tended to circumvent external monitoring and the self-regulation system to which it is subject has proved to be inadequate in many respects. It should be remembered, first of all, that European patent governance is primarily carried out by the EPO acting as a granting office which is formally independent. This status of an independent supranational organisation has been mitigated by the EU, the influence of which has been indisputable since the Biotechnology Directive (Schneider, 2009a, p.619). The discussions carried out within the European Parliament on the Directive had the indirect effect of bringing the democratic debate before the EPO (Schneider, 2009b). Much was expected from the adoption of the 'regulation implementing enhanced cooperation in the area of the creation of unitary patent protection' [Regulation (EU) no.1257/2012]. To be sure, this new legislative act represents a milestone in the institutional long-awaited rapprochements. But the EU missed the opportunity to install democratic control of the EPO and review of the EPO's judicial bodies. As shown many times by Drahos, if patent offices are administrative agencies, they are of a very specific sort:

> Patent offices are hybrid creatures, business bureaucracies which make their living from granting more than less patent registrations, from ensuring the repeat custom of their transnational clientele and from going on proselytising missions in those developing states or new market economies which are in the middle of acquiring patent systems. (Drahos, 1999, p.442)

The ensuing consequences are numerous: first, the fact that an administrative agency such as the EPO is self-funded may influence its granting policy (Picard and Van Pottelsberghe de la Potterie, 2011). Second, patent offices – and the EPO is no exception – do not involve actors who might support options for non-patenting. As a result, 'this may arguably tempt an office to treat its applicants as customers to be served' (Hagel, 2004). Thirdly, and as an extension of the preceding observation, a patent office can be prone to regulatory capture. Officials in charge of the patent office are faced with the risk of being captured by their applicants/customers. This 'means that although an office is supposed to be acting in the public interest, it may be dominated by the vested interests of its users, particularly the large multinational companies' (Schneider, 2009a, p.7). Lastly – and it might be said that this last argument is all-encompassing – patent offices are often structured around an epistemic community (Hass, 1992; Schneider, 2009a), what Drahos (1999, p.441) calls a 'patent community'. The term refers to a coherent structure formed of patent attorneys, lawyers, patent administrators; in short, experts who have the same technical expertise, share the same values and assumptions such that, whenever interpretative issues are to be settled, they show support with one pro-patent voice (Boyle, 2003; Schneider, 2009a).

As a final point, it is necessary to figure out why and how this situation has arisen. Why has the decision-making process proved to be so self-serving and self-referential? Why can we observe a pro-patent bias and a constant erosion of boundaries in exclusions from patentability? Why has communication been disrupted between the EPO and civil society to the point of depriving patent protection of all democratic legitimacy, and to the point of ignoring threats to the patent system itself? Answering that set of questions is greatly aided by focusing on the ideology framework developed by Habermas (1989). The institutional framework of a society consists of norms that guide symbolic interaction. The 'sociocultural life-world of Habermas is dominated by a specific form of action – communicative action – which should be understood as symbolic interaction, governed by binding consensual norms objectified in ordinary language' (Habermas, 1989, p.244). But in every society, however traditional, there are subsystems, such as the economic system or the state apparatus, in which a completely different form of rationality has been institutionalised – purposive-rational action. This sort of rationality, otherwise referred to as 'work' (Habermas, 1989, p.244), may be either an instrumental action, which obeys technical rules and is based on empirical knowledge, or rational choice, which is governed by strategies based on analytic knowledge. Common to all traditional societies – marked by an economy dependent on agriculture and craft production – is their ability to keep these subsystems within limits. Changes only occur when the capitalist mode of production endorses the pre-capitalist and pre-industrial idea that the individual can be relied on, without external control, to promote the interests of the community (see Halévy, 1972). Capitalist society has succeeded in creating, following a market society model, a powerful economic ideology (Rosanvallon, 1999) that has opened up a phase of rationalisation in the Weberian sense (Kalberg, 1980). When the rationality of language games, associated with communicative action, becomes confronted with the rationality of means–ends relations, the traditional form of legitimation breaks down (Habermas, 1989, p.247). But the strength of this doctrine, while giving a new tool for a criticism of world views, traditional interpretations of nature (in relation to religion, myths, customs) and thus provoking disillusionment of the world (the process of secularisation), is that it provides new forms of legitimation stemming from the rationality of the market and the ideology of an exchange society (Habermas, 1989, p.248). The result is that the state is now governed by purposive-rational action (a constant adaptation of means to ends). It focuses only on the system's stability and growth, the elimination of dysfunctions and the selection of risk-avoidance options. While politics takes a negative character, practical substance and fundamental issues of the good life are completely eliminated from the political field and the public loses its political function (Habermas, 1989, p.252).

It would be an exaggeration to contend that there has been no public debate on the rationale and existence of intellectual property rights over the two past decades. The 'European Parliament resonated with concerns about ethical limits to patent eligibility, in particular with respect to the status of the human body and to gene patents' and it 'addressed the erosion of the public domain of open science' (Schneider, 2014, p.158). As a result, the Biotechnology Directive has sought to reintroduce some ever-fading boundaries to patentability, notably in the field of *ordre public*, with the adoption of a new non-exhaustive list of provisions excluding from patentability some inventions deemed immoral (e.g. processes for cloning human beings, processes for modifying the germ line genetic identity of human beings) (Schneider, 2014). But there are many signs that the victory has turned out to be a hollow one. Patent examiners, supported by patent attorneys and patent applicants as well as by specialist patent courts, keep arguing that 'patent offices should and could not be moral arbiters, as they neither have competency nor the mandate to make judgments on morality' (Schneider, 2014, p.151; see also Baumgartner, 2006). Value-laden issues are carefully avoided (Schapira, 1997; Drahos, 1999) and cleverly replaced by technical debates reserved for technicians and technocrats working in administrative agencies and regulatory agencies. Thus, it comes as no surprise to find the EPO president claiming the value-free nature of patent law in his recent comments to the Enlarged Board of Appeal in the Tomato II case (Battistelli, 2012). Likewise, it is no wonder that the debate around the institutional organisation of the unified patent court and unitary patent system has resulted in minimum consensus on the judicial review power exercised by the European Court of Justice (ECJ) and the democratic scrutiny power granted to the EU in general over the EPO administration of the patent system.[7] There was a great concern among the patent community that the ECJ be competent to deal with the scope and effects of the unitary patent by way of referral questions.[8] The final result is not substantially different from what was intended and the only essential point to be noted is that the ECJ is denied any competence to rule on the merits in the field of patent (European and unitary), and can intervene in patent issues only through preliminary ruling.

Above all, there is an inner factor that explains the institutional deafness we are experiencing and which is compromising the very existence of the patent system. If civil society and critical academics are crying in the wilderness, it is because the process of rationalisation has been carried forward to the point of stifling the institutional framework of society, to some extent still governed by communicative action. Ironically, this has been caused by the need to find, in a context of partial failure of the market ideology (failure evidenced by the development of competitive law and regulatory mechanisms), a new source of legitimation (Frison-Roche, 2005). In any event, this is the point where the development of a new ideology can be witnessed – that of science and technology. According to Hans Blumenberg (1983, p.369; see also Marr, 2006) the condemnation of intellectual curiosity could have been generated by response to an uncontrollable urge for knowledge (*libido sciendi*). There is a widespread perception that the sensible world provides the only access from logical and mathematical treatments – without value judgment – to authoritative knowledge (Kolakowski, 1972). But the major changes – those that explain why conflicting views are so few and, in any case, disregarded – occurred only at the end of the nineteenth century with the scientisation of technology. Hitherto, technical development was closely linked to the progress of modern sciences. Thus, the 'quasi-autonomous progress of science and technology appears as an independent variable on which the most important single variable, namely economic growth, depends' (Habermas, 1989, p.253). This is probably all the more true as we have entered the so-called 'knowledge-based economy' phase (OECD, 1996), in which the development of the social system is tightly linked to the logic of scientific-technical progress. The logic of the market as a means to produce common goods is thus replaced by that of science and technology, presented as instruments of both sustainable growth and welfare maximisation. This can be summed up in an equation: 'patents equal innovation, equals economic development, equals therapeutic improvement, equals beneficence for general wealth, and thus benefit for the common good' (Schneider, 2009b, p.134). This new ideology of progress, so intimately linked to our *libido sciendi*, our desire to control Nature (*libido dominandi)* (see Pascal, 1958, fragment 458) and our fear of death in a disillusioned world (Weber, 1946, p.155) can operate as an immanent law 'which must be obeyed by any politics oriented toward functional needs' (Habermas, 1989, p.253).

Conclusion

If the patentability of native traits and genes has been gradually recognised, it is because the judicial bodies of the EPO have been working at a constant erosion of the boundaries drawn by the drafters of the EPC. Driven by a pro-patent bias, the working organs of the EPO have proven themselves indifferent to the arguments that could have led to a completely different interpretation of the fundamental provisions of the EPC. The EPO's withdrawal into itself is largely attributable to governance issues. These have been clearly identified by many scholars who have shown why the decision-making process has proved to be self-serving and self-referenced. But the breakdown of communication and the degradation of the public sphere are caused by another factor, namely the rise of an ideology of a new kind, that of science and technology. Our desire to master the world, mirroring the gradual awareness of our finite (ephemeral) existence, is fuelled by the daily experience of the improvement of our living conditions. We have a natural tendency to believe that what is newest is what is best. Hence the constant emphasis on the importance of the patent system, the aim of which – it is said – is mainly to promote innovation. Hence also the rejection of any question which no longer relates to the dominant technocratic rationality.

The situation is not as simple as the patent community contends. Most economists recognise that the central debate about intellectual property rights (and especially about the patent) is how to strike the balance between the 'dynamic efficiency effect (worth to the public) and the static inefficiency effect (embarrassment) caused by the market power that patent systems grant to innovating firms' (Picard and Van Pottelsberghe de la Potterie, 2011). Depending on the way that the intellectual property system is framed (optimal length, optimal breadth, optimal geographical scope of protection) and, above all, operated by the patent community (offensive and defensive portfolio strategies, licensing strategies, patent claims, drafting strategies, granting of overly-broad patents, narrow construction of exclusion from patentability), it can spur or impair the innovation process (Landes and Posner, 2003). In addition, innovation is not the only value at stake. Indeed, as several studies are beginning to reveal, the expansion of intellectual property rights in the seed sector may not only have a negative impact on biodiversity, but may also place access to adequate food in poor communities in jeopardy (Frankel and Bennett, 1970). This message must be heeded. It will not be heeded while we are unable to overcome public communication barriers. Unless we do, '*the treasure of nature's germens tumble all together*'.

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Notes

1. By 1960, the choice was made in Europe to protect plant varieties by a *sui generis* system, the Plant Breeder's Right. The first system of plant variety protection came into being with the adoption of the International Convention for the Protection of New Varieties of Plants by a Diplomatic Conference held in Paris on 2 December 1961.
2. Tomatoes II – STATE OF ISRAEL/Tomatoes (G1/08) unreported 9 December 2010 (EPO, Enlarged Board of Appeal) and the referral of the Broccoli case G2/13, Broccoli II – PLANT BIOSCIENCE/Broccoli (G2/07) unreported 9 December 2010 (EPO, Enlarged Board of Appeal).
3. See https://register.epo.org/application?lng=en&tab=doclist&number=EP08749952.

4. Technical Board of Appeal, 8 July 2013, interlocutory decision, T83/05 [EPO (Technical Bd App) 83/05], OJ EPO 2014, A39, at 24.
5. Frequently obtained from a microorganism intended to be introgressed into the plant cell (with a promoter) at a specific spot of the genome.
6. See: Decision of the Administrative Council of the European Patent Organisation of 16 June 1999 concerning the incorporation of Directive 98/44/EC into the Implementing Regulations to the European Patent Convention, OJ EPO 7/1999, p.437. This decision has been heavily criticised has being 'unlawful'. It has thus been contended that due to the remarkable changes brought about by the Biotech Directive, the implementation of the EU legal instrument would have required a Diplomatic Conference (Godt, 2007 cited in Schneider, 2009a).
7. The so-called 'unitary patent package' consists of a set of three texts: Regulation (EU) No. 1257/2012 of the European Parliament and of the Council of 17 December 2012 implementing enhanced cooperation in the creation of unitary patent protection; Council regulation (EU) No. 1260/2012 of 17 December 2012 implementing enhanced cooperation in the area of unitary patent protection with regard to the applicable translation arrangements; and the Agreement on a Unified Patent Court and Statute (2013/C 175/01), (OJEU 20.6.2013, C 175/1).
8. The preliminary drafts of what would become Regulation (EU) No 1257/2012 (see Council Document 8588/09 of 7 April 2009 on a revised proposal for a Council Regulation on the Community patent: http://register.consilium.europa.eu/doc/srv?l=EN&f=ST%208588%202009%20INIT [accessed June 2015]) incorporates three controversial articles (Art. 6–8) related to direct and indirect infringements of patent rights. Because of the sometimes intricate nature of these issues, it was feared that national courts involved in the application of these provisions might 'see an occasion or an obligation to submit the matter to the Court, in particular if they have still little experience in patent law' (Kraßer, 2011, p.7). To circumvent these difficulties, it was suggested these provisions be removed from the Regulation and introduced in the international agreement on the unified court. See the debate between Kraßer and Winfried Tilmann (2012, w9, para. 15).

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