Title: Patenting Beer
Subtitle: An analysis of plant product patents with specific focus on the impact of those patents granted for beer grain plant mutations to Carlsberg and Heineken

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Abstract

This thesis examines the impact upon EPO interpretation of European plant patent law of the case Carlsberg and Heineken pertaining to the granting of patents for beer grain enzyme mutations. This analysis will look at current interpretation of the patentability of plant products dependant on the classification of their production process, as well as the extent of the scope of protection granted to these plant patents.

This area of law pertains to the exemption of plants from patentability within the European Patent Convention and the Biotech Directive 98/44/EC, with reference to the interpretation of this legal basis within EPO case law. Within this the definition of an ‘essentially biological process’ and the subsequent patentability of the products of these processes is crucial to evaluating why the Carlsberg and Heineken patents were granted and where there remain unanswered questions after this case as to EPO interpretation of European plant patent legislation.

From this basis, it shall be shown that the beer cases of Carlsberg and Heineken mark a turning point in the interpretation of the plant patentability exception and the scope of protection granted to these patents. Changes to legislative interpretation, the industry and economy of beer production, agriculture and the morality of food patents shall all be addressed with regard to the impact of the Carlsberg and Heineken patent decision.
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## Abbreviations

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<tr>
<td>CPVR</td>
<td>Council Regulation (EC) No 2100/94 of 27 July 1994 on Community plant variety rights</td>
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<td>EBA</td>
<td>Enlarged Board of Appeals of the European Patent Office</td>
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<td>EPC</td>
<td>European Patent Convention 1973</td>
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<td>EPO</td>
<td>European Patent Office</td>
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<td>EU</td>
<td>European Union</td>
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<td>GMO</td>
<td>Genetically Modified Organism</td>
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<td>NGO</td>
<td>Non-Governmental Organisation</td>
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<td>PGS</td>
<td>T 0356/93 (Plant cells) [<em>Greenpeace Ltd. v. Plant Genetic Systems</em>] OJ EPO 1995, 545</td>
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<tr>
<td>SPC</td>
<td>Supplementary Protection Certificates</td>
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<tr>
<td>UPOV</td>
<td>International Convention for the Protection of New Varieties of Plants 1991</td>
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<tr>
<td>UK</td>
<td>United Kingdom</td>
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<td>US</td>
<td>United States of America</td>
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1. Introduction

1.1 Background

An area of intellectual property law that has gained a great deal of attention recently from within both the legal system, from those working within the industry, as well as the press is that of patents on food; with the increasing prevalence of these specific type of patents and ensuing debates as to their interpretation of current European legislation bringing them to the forefront of varied attention. Here, plant patents will be used to denote the general classification of plant products or materials that have been granted patent protection. These forms of plant patents have become more accessible to producer through the precedent established by successive plant patents granted by the EPO to plant products, including for example tomatoes and broccoli. Debate regarding these plant product patents rose to the fore in 2016 as a result of the EPO patents granted to market forerunners Carlsberg and Heineken for beer grain mutations. This case highlighted a change in interpretation as to the scope of protection provided by these patents. Resultantly, a specialised study of these beer patent cases has the ability to encapsulate the current EPO interpretation of European patent law pertaining to plant products.

1.2 Research Question

This study aims to address the relatively new legal interpretation questions pertaining to plant patents; specifically those of food plants. This shall be done through the interpretation of the specific case of beer patent protection. Therein, the purpose of this study shall be to address the changes to European legislative interpretation set out within the beer patent cases of Carlsberg and Heineken, as well as the remaining legislative interpretation questions that have yet to be granted guidance by the EPO. These questions pertain to the patentability of plants dependant on the classification of their process of production, as well as to the extent of the scope of protection granted through these patents. Additionally, it shall be evaluated whether or not current EPO legislative interpretation derived from the cases of Carlsberg and Heineken is to the detriment of the industry or against core intellectual property intrinsic aims.
1.3 Methodology

The legal dogmatic approach will be used to analyse the current EU and Europe wide patent legislation following the rules of legal hierarchy to form a basis from which the changes subsequently made through the enforcement of the Carlsberg and Heineken beer patents can be discussed.

Firstly, a doctrinal study of the current European patent legislation shall be undertaken to build an understanding of the extent to which current legislation details how plant products are to be considered when applying for patent protection. For this reason focus will predominantly fall upon the European Patent Convention (henceforth EPC) and the subsequent Directive 98/44/EC of the legal protection of biotechnical inventions (henceforth Biotech Directive) as well as a brief analysis of the International Convention for the Protection of New Varieties of Plants (henceforth UPOV) and the Regulation for plant variety rights (henceforth CPVR). Within these legal instruments focus shall be made to those articles pertaining to exemptions from patentability, specifically those regulating ‘essentially biological processes’ and the patentability of the products of such processes in comparison to those categorised as technical processes.

Thereafter the interpretation of this legislation by the EPO shall be evaluated through case law example, specifically those for food products. This shall be done through first looking at the interpretation of the phrase ‘essentially biological processes’ in the Tomato and Broccoli cases, as well as the consequences of the way in which this phrase in interpreted on the patentability of plant products of such processes. Thereafter the cases pertaining to the granting of beer patents to Carlsberg and Heineken will be evaluated with regard to this legislative basis.

Lastly, the impact of the interpretation of EU patent legislation through the Carlsberg and Heineken cases on the legislation, the beer production industry, and agricultural biodiversity shall be evaluated. Additionally, the morality of the EPO’s decision shall be analysed. This

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shall be done through the views and commentary presented by both those opposed to the
decisions of the EPO regarding beer patents as well as expert commentators, newspaper
coverage, legal scholars, etc. within these fields.

1.4 Delimitations

There are a number of aspects that fall out-with the central discussion of this thesis.

As the focus of this study pertains to the EPO cases of Carlsberg and Heineken which involve
macro-biological processes, an analysis of the impact of the presence of microbiological steps
in a process on the patentability of the resultant plant products will not be undertaken. Microbiological processes are addressed separately from macro-biological processes within
both the EPC and Biotech Directive and therefore are not integral to the analysis completion
of this particular study.

This study shall also not look at the impact or importance of Supplementary Protection
Certificates (henceforth SPCs).³ Though analysis of SPC’s – offered to extend the time
limitations of patent protection for pharmaceuticals and plant patents to offset the losses that
occur as a result of the lengthy testing and trial process – may be of interest with regard to the
benefits available to plant patents comparable to pharmaceuticals. This line of analysis would
focus more on the benefits available to this kind of patents once granted and the attraction for
producers to this form of intellectual property protection. This is therefore not within the
remit of this study.

Additionally, although other jurisdictions out-with Europe will be called upon to provide
comparison and to support conjecture regarding the extended future impact of the Carlsberg
and Heineken patent cases, a comparative overview between the legislation of Europe and
these other jurisdictions shall not be undertaken. As the focus of this study is to gain an
understanding of the current legislative implementation within Europe, any comparison,
beyond that undertaken in section 4, regarding the impact of this implementation is
unnecessary.

³ Jean-Luc Piotraut, “European nation IP laws under the EU umbrella: From national to European community IP
law” (Loyola University Chicago International Law Review, Vol. 2, issue 1, 2004): 81
1.5 Structure

Structurally, there are three aspects to the analysis of the question of patenting beer; establishing a legislative basis for the issues surrounding beer patents, an analysis of EPO case law with particular focus on the cases of Carlsberg and Heineken, and an analysis of the possible and probable extended implications of the granting of patents to beer gains.

Firstly, this study will evaluate the forms of intellectual property protection available to beer grains, including both plant variety rights and patents, to the way in which plants were interpreted within EU patent legislation before the cases of Carlsberg and Heineken in 2016. Within the EPC and the Biotech Directive, articles pertaining to exception to patentability and to the patentability of plant products are of most value within this study. Here reference will also be made to relevant EPO case law predating the Carlsberg and Heineken cases.

Thereafter, analysis of the Carlsberg and Heineken cases may be undertaken, evaluating both the changes to legal interpretation made as a result of the initial granting of the Carlsberg and Heineken beer patents as well as the changes that arose from the later limitations placed of the scope of the patents by the EPO after a backlash of opposition against the initial patents.

Finally, the possible future implications of the granting of these patents shall be evaluated. These pertain not only to the legal impact of these cases, but also to the economic, industrial, agricultural and moral impact. Here due attention will be paid to the issues and questions that have arisen through the voicing of opposition again these cases and the legal precedent they establish.
2. Legal framework for the intellectual property protection of plant products

2.1 Why plant patents?

In order to form a complete understanding of the intellectual property protection available to beer patents, firstly the legal framework of protection available to plant products must be understood. Through looking at both plant variety rights and plant patents an understanding of why the latter form of intellectual property protection has become increasingly sought after by producers.

As with the vast majority of plant processes and products seeking intellectual property protection, there is a vast amount of investment put into their development, primarily in the form of time and money. As a result, it is logical that producers aim to procure a sufficiently reciprocal level of legal protection in order to reap profits to their full.4

Though it is technically possible for beer producers to patent the recipe of their products, such patents are difficult to procure within the European patent system. The composition of the recipe may be considered a chemical composition, and therefore within the bounds of patent law where all criteria expressed in Article 52 of the EPC are met.5 In the case of food recipe patents, a product may be classified as inventive where the product includes:

“[… ] improvements in stability, shelf life, breakability or packaging, or novel ways of providing or masking flavours or smells, reducing calories etc. The production process may also have some novel aspects worthy of patent protection, for example, changes in apparatus or methods to achieve new effects or to provide improved efficiency or a reduced footprint (physical or carbon).”6

However, such patent protection is not often opted for by producers due to most run of the mill food and drink recipes do not possess the novelty or technical applicability to issues required to qualify for a patent. It is not however impossible to gain a patent for a recipe with some food and drink recipes acquiring the required levels of inventiveness in order to be granted a patent.

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4 Directive 98/44/EC, recital 2
5 EPC 1973, art 52
6 Gillian Taylor, ‘Food for thought – patents protecting food-related inventions’ (Reddie &Große LLP, 2016)
As a result of the limited possibility to patent recipes, for areas of food and drink production such as that of beer often it is not the recipe itself that the owner seeks to patent, but rather the method or chemical composition of the raw materials used, in the case of beer production being grains. With this in mind, there are two major areas of intellectual property protection that apply to plant mutations – as will be the focus of an analysis of the Carlsberg and Heineken beer cases – these being plant variety rights and plant patents. With the recent rise in EPO food patents for food stuffs such as tomatoes, peppers, melons, broccoli, etc. these food plant products have to ability to fall within both plant variety and plant patent classifications of intellectual property law.\(^7\)

It is important to understand the perceived downfalls of plant variety protection pertaining to food products in order to understand why plant patents have increasing become the Intellectual property protection of choice for many producers.

**2.2 Plant Varieties**

Plant variety protection is an area of intellectual property protection specifically developed in order to protect new varieties of plants, the definition for which can be found within Article 5(2) of the 1991 Union for the Protection of new Varieties of Plants (UPOV) convention.\(^8\) Plant variety rights are in part the culmination of an alternative to plant patents, on account of opposition historically posed against the ability to grant monopolistic rights to plants or plant materials.\(^9\) This opposition towards plant patents initially were built up of hesitation for two main reasons: 1. Plant varieties are lacking in traditionally classified inventive aspects, and 2. there was a moral argument against creating a monopoly for food on the grounds of public interest.\(^10\) The latter of which remains a view held by many that shall be considered in section 4.4. Regarding the former issue due to their unstable nature and “their propensity to spontaneous genetic variation” patents are not applicable for plant varieties.\(^11\) However, changes in the form of improvements in genetic influencing technological development

\(^8\) UPOV 1991  
coupled with the EU’s attitude to plant patents pertaining to developing methods of food production, genetic modification, and breeding can be seen as a catalyst in increasing favour paid towards plant patent protection by producers.

Advances in technical processes, from methods traditionally consisting of targeted sexual reproduction of plants in efforts to manipulate desired traits towards new technical methods of cellular level manipulation, have allowed for producers to more accurately and consistently guarantee that desired traits are obtained within these plants. These newer methods of production allow the possibility for their resultant products to be granted protection from within the scope of plant patents, rather than merely plant variety rights. The move towards these newer processes from conventional breeding called for a reassessment of conventional patent requirements, as set out in article 52 of the EPC and its interpretation.

An important case in the change of these EPO attitudes is that of the Plant Genetic Systems case. Through the Enlarged Board of Appeal’s judgement the EPO narrowed their interpretations of what constitutes a plant variety. The Board narrowed the EPO’s definition of a plant variety:

“[…] as being less than a single gene's separation between two plant lines”.

This decision opened up the scope for which plant patents can be applied for.

Arguably most prominently, the move from plant variety rights to the want for plant patents can be seen to have been impacted most by Article 2(1) of the Union for the Protection of new Varieties of Plants (UPOV) which states that a product cannot be granted both plant variety right protection and patent protection; this itself implementing of the original formulation of the exclusion in the Strasbourg Harmonisation Convention 1963 Article 2. The EPC and Biotech Directive both grant that plant varieties are not permissible to be patented. As stated in the recitals preceding the Biotech Directive, through either an essentially biological process or a technical process, if the resulting product is a new plant

13 EPC 1973, art 52
16 UPOV 1991, art 2(1)
18 EPC art 53(b); Directive 98/44/EC 4(1)(a)
variety said new plant variety will not be patentable as it shall not fulfil the requirement for a patent as it falls within the general patent exceptions.\textsuperscript{19} This exclusion was further re-enforced through the decisions of the joint EPO cases G2/07 and G1/08.\textsuperscript{20} This lack of duality has impacted the move from businesses and producers with the economic ability towards aiming to develop products and processes able to apply for what they may perceive to be greater – or more economically advantageous – protection rather than products with only plant variety right protection available.\textsuperscript{21}

### 2.3 Plant patentability

Plants were first given patentable status during the 1960’s.\textsuperscript{22} The movement of producers from aiming for plant variety protection to patent protection warrants a new, specialised focus to the understanding and interpretation of European patent law. Traditionally the lack of novelty and inventive step required of patents is often lacking in plants materials and plant products.\textsuperscript{23} European legal definition of an invention stems from the German \textit{Red Dove} case.\textsuperscript{24}

“[…] since an invention comprises a teaching methodically to utilize controllable natural forces to achieve a causal, perceivable result that can be repeated an arbitrary number of times obtaining the same result each time”.\textsuperscript{25}

However, in more and more cases the inventiveness of these plants and plant materials procured through technological processes is displayed to the level required to be considered on a par with other chemical inventions permitted to be granted patent protection.\textsuperscript{26}

\textsuperscript{19} Directive 98/44/EC, recital 31-32
\textsuperscript{21} Pila & Torremans, European Intellectual Property Law (2016): 223
\textsuperscript{23} Pila & Torremans, European Intellectual Property Law (2016): 222
\textsuperscript{24} \textit{Red Dove X ZB} 15/67, 376 [1970] \textit{German Federal Supreme Court} IIC 136; from Pila & Torremans, European Intellectual Property Law (2016): 222
\textsuperscript{25} Pila & Torremans, European Intellectual Property Law (2016): 222
\textsuperscript{26} Ibid: 220
“[…] it seems likely that a patent application in respect of a genetically engineered plant will be allowable so long as the engineered plant is not held to be a plant variety and the invention meets all the other requirements for patentability”. 27

Additionally, it can be argued that these cellular level developments of plants have the ability to push desired traits beyond the possibilities of traditionally bred plant varieties, or at least at a speed and with the accuracy unavailable to traditional breeding methods. Arguably this is within the public interests. 28 These methods of breeding can ultimately create more efficient and consistent methods of grain production which benefit farmers and producers alike, as well as ultimately the end consumers. 29 The advances in technical methods of plant production go beyond merely agricultural, with knock-on advances in other industries including medical, and as the focus of this study, food production. 30

As the case of interest within this study pertains to the products of plant processes, rather than the processes themselves of the recipes of the final beer products, the analysis of European patent legislation that will be undertaken we focus on said plant products.

For this analysis a dogmatic method shall be used. To assess the patentability of plant materials both the European Patent Convention and the subsequent Directive 98/44/EC on the legal protection of biotechnological inventions are applicable. It is important to note the legal hierarchy of the relationship between these two legislative instruments. Upon its implementation the relevant articles of the Biotech Directive were not incorporated into the EPC by the administrative council of the European Patent Organisation; rather they were included in the EPC’s implementing regulations. 31 Resultantly, both the EPC and the Biotech Directive must be assessed with regard to these Articles pertaining to plant patentability rather than merely the EPC. It should be noted that the EPC is not directly subject to the Biotech Directive as there are many member states that are members of the EPC are not EU

29 Ibid: 221
31 Implementing Regulations to the Convention on the Grant of European Patents [1973] [last amended by decision of the Administrative Council of the European Patent Organisation June 2018]: rule 28
member states, and are therefore not subject to the Biotech directive.\(^{32}\) The EPC and the EU are not interchangeable jurisdictions.

### 2.4 Plant Patents within the EPC

Where plant patent application firstly meets all requirements of patentability set out in Article 52 of the EPC, then attention should be drawn to Article 53 of the EPC which establishes exceptions to patentability.\(^{33}\) In addition to Article 53 of the EPC, the report of the European Parliament regarding the creation of the Biotech Directive stated in explanation of the prohibition of patenting essentially biological processes that said processes should not be able to apply for patent protection due to their lack of compliance with the general stipulations required of patentable products or processes in that they are not inventive in nature and are not reliably reproducible.\(^{34}\) However, with advancing methods of plant product production the sentiment of this statement has been reassessed. As it stands, often plant products meet the requirements of Article 52 of the EPC with regard to their inventiveness. Therefore, plant exceptions to patentability are the prime focus of discussion surrounding beer patents. The main focus of this study of the EPC pertains to Article 53, which states that patents shall not be granted to:

“[…] Plant or animal varieties or essentially biological processes for the production of plants or animals”\(^{35}\)

As demonstrated through opposing arguments from those such as Erling Frederiksen, a representative of the organisation No Patents on Seeds! this phrase ‘essentially biological processes’ forms the basis for the discussion surrounding the ability to patent food plant products. In his statement the No Patents on Seeds! representative stated that:

“Despite legally binding rules, the EPO continues to grant patents on plants derived from conventional breeding.”\(^{36}\)


\(^{33}\) EPC 1973, art 52-53


\(^{35}\) EPC 1973, art.53(b)
To full analysis this accusation firstly an understanding of what constitutes ‘conventional breeding’ or essentially biological processes as they are referred to within the EPC. Article 53 of the EPC goes no further in setting out a definition entailing the scope of the term essentially biological processes. To proceed, it must be understood within current European patent legislation what is understood to fall within the scope of the term ‘essentially biological processes’. The way in which the processes through which plant products are produced are classified is essential to understanding the patentability of these end plant products. As there is not sufficient information within the EPC alone as to the interpretation of the term ‘essentially biological processes’ and the subsequent repercussions of a products creation process falling within this classification further European legislation must be drawn from; in this case the Biotech Directive.

2.5 Plant patentability within the Biotech Directive (98/44/EC)

As previously noted, plant patentability is only referred to once within the EPC in the form of an exclusion to patentability. Further clarification was sought by the European Parliament and the Conciliation Committee jointly, culminating in the creation of the Directive on the legal protection of biotechnological inventions known as the Biotech Directive. This Directive was adopted in 1998 to extend the understanding of plants and plant material within patent law out with the EPC and to harmonize patent protection throughout member states. The questions raised in the creation of the Biotech Directive by the developing technology behind possibly patentable plants that had not been previously covered by the EPC were as follows:

1. What can be classified as an essentially biological process?
2. Does the nature of the process used impact the patentability of the product?

2.5.1 What can be classified as an essentially biological process?

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The term essentially biological is first referred to within Article 53 of the EPC, but lacking in further guidance within the Convention as to the interpretation of this term. It can be seen that this Article is mirrored within the exceptions to patentability listed within Article 4(1) of the Biotech Directive stating that:

“essentially biological processes for the production of plants or animals [shall not be patentable]”.\(^{38}\)

There is discrepancy within legal interpretation of the line to be drawn between the definition of “essentially biological processes” as stated in Article 53 of the EPC and Article 4(1)(b) of the Biotech Directive and that of a “technical process” as stated in Article (3)(2) of the same Directive. In answer to the problem posed by this lack of clarification Article 2(2) states that:

“A process for the production of plants or animals is essentially biological if it consists entirely of natural phenomena such as crossing or selection”.\(^{39}\)

The word ‘entirely’ rather that ‘essentially’ is key here. Where ‘essentially’ is used in the EPC general interpretation would indicate that its meaning is not the same as ‘entirely’ or ‘purely’ as was the previous wording of this exception in the EPC.\(^{40}\) Therefore the additional use of the word ‘entirely’ here conflicts with the understood meaning of the word ‘essentially’. This interpretation is thought by legal scholars to purposefully narrow the ability to exclude processes from this exception merely because they contain an element of human intervention.\(^{41}\) The wording of this exception within Article 2(2) of the Biotech Directive was also narrowed twice during the drafting of the Directive.\(^{42}\) It is therefore the question of what kind of human intervention qualifies.\(^{43}\) It may be gained from this article – in combination with the recommendation made for the creation of the Biotech Directive – that the use of the word ‘entirely’ establishes that a process may be applicable for patent protection where at least one element or step within the process is non-biological, such as a microbiological step, such being directly stated in article 4(3) of the Biotech Directive.\(^{44}\) However, there is still

\(^{38}\) Directive 98/44/EC, art 4(1)(b)
\(^{39}\) Directive 98/44/EC, art 2(2)
\(^{40}\) Sven J.R. Bostyn, ‘How biological is essentially biological? The referrals to the Enlarged Board of Appeal G-2/07 and G-1/08’ (European Intellectual Property Review, 31(11), 2009)
\(^{41}\) Bostyn, ‘How biological is essentially biological?’ (2019)
\(^{42}\) Brabin, ‘Intellectual property law in the realm of biology - striking the right balance’ (2014)
\(^{43}\) G1/08 (Tomatoes/State of Israel) OJ EPO 2010, recital 10
\(^{44}\) Commission Notice on certain articles of Directive 98/44/EC on the legal protection of biotechnological inventions (2016): 1.2; Directive 98/44/EC, art 4(3)
inconsistency within the dual use of ‘essentially’ and ‘entirely’ within Article 2(2), which logically and semantically mean different things.\footnote{Sven J.R. Bostyn, ‘Resolving the conundrum of the patentability of plants produced by an essentially biological process: squaring the circle?’(European Intellectual Property Review, 35(7), 2013)}

Beyond the conflicting statement of Article 2(2), there is little extra guidance as to how the definition of the phrase ‘essentially biological processes’ is to be interpreted in practice from within the legislation itself. It has been inferred by some that with reference to Article 64(2) of the EPC which details the relationship between a process and its products in terms of patentability that ‘essentially biological’ can be interpreted as processes that produce products that are classified clearly as plant varieties.\footnote{Tritton et al., Tritton on Intellectual Property in Europe (2014): 203} If this interpretation is to be accepted, this would lead to the interpretation of processes and products to become too closely dependent upon one another. This issue shall be addressed in section 2.5.2.

Through the additional clarification of Article 2(2), a narrower interpretation of the term essentially biological processes can be made. The interpretation of this legislation as to the scope of definition of the term essentially biological directly impacts the way in which the products of these processes are assessed for patentability, directly relating to food plant patents such as the cases of Carlsberg and Heineken.

2.5.2 Does the nature of the process impact the patentability of the product?

Between Articles 2(2), 3(2) and 4(1)(b) of the Biotech Directive it is established that essentially biological processes may not be patented whereas a technical process may be. To assess Carlsberg and Heineken, clarification is required as to how the interpretation of these two terms impacts the pant products of these processes. It is vital to understand the classification of the process in order to fully evaluate the patentability of the product. This is of particular importance when the products, such as those seen in many food cases, of these processes mirror, or come substantially close to mirroring, those that can be found conventionally within nature.

Firstly, it should be known that where the means through which a plant product is produced comes within the term ‘technical process’ then the evaluation of its patentability is a significantly simpler process. Article 3(2) of the Biotech Directive states that where the
processes through which the plant product is produced is technical in nature then the product can automatically be considered as inventive when assessing patentability, regardless of the possibly essentially biological nature of said end product:

“Biological material which is isolated from its natural environment or produced by means of a technical process may be the subject of an invention even if it previously occurred in nature”. 47

This Article show that the process by which the end plant product is created is integral to its patentability in the case of technical processes; this is irrespective of the biological nature of the end product. However, the mirror situation where the process is essentially biological is not legislated upon. 48 Should it be understood that products of essentially biological processes may not be patentable without additional technical changes made to them, 49 where comparable products of technical processes that are in no way an invention in their own right have the ability to be patented solely derived from their method of creation? Therefore, as patentable processes produce patentable products, so do unpate-50 nt processes yield un-50 patentable products. If current legislation is to be understood this way then then the importance of the processes through which plant products are made may be considered to have been given unjust weight almost regardless of the inventive nature of the product itself. Legal scholars have commentated upon this question stating that the law should grant that the patentability of products is directly linked to the patentability of the process through which they are obtained, where the product can only be obtained through that said process. Though this interpretation may seem logical, there are still questions as to its interpretation. For example, where there to be a situation arise where the product of an essentially biological process was to be produced that was the same as one previously patented as the result of a technical process. Does the patent protection for the product of the technical process extend to the essentially biological process that may have occurred unintentionally as the result of conventional breeding methods? Rather, should it be understood that patent protected plants may only enforce their scope of protection onto the same or sufficiently similar products that also occur through technical processes. This question has yet to be addressed by the EPO.

47 Directive 98/44/EC, art 3(2)
49 Directive 98/44/EC, art 3(1)
Article 8(1) of the Biotech Directive states that:

“The protection conferred by a patent on a biological material possessing specific characteristics as a result of the invention shall extend to any biological material derived from that biological material through propagation or multiplication in an identical or divergent form and possessing those same characteristics.”51

Additionally, Article 9 states in concurrence with Article 8(1) that:

“The protection conferred by a patent on a product containing or consisting of genetic information shall extend to all material, save as provided in Article 5(1), in which the product is incorporated and in which the genetic information is contained and performs its function”

Both state that where the specific characteristics protected by the patent are duplicated through the same or different methods these plants products with the duplicated characteristics fall within the scope of the original patent. As there is no further interpretation of the legislation it must be interpreted that these ‘divergent’ processes will include essentially biological breeding methods. It is unclear if the EPO intended otherwise through interpretation of the legislation alone.

With the advances in technologically developed beer grains these targeted, more industry appealing traits and mutations are begin produced at an accelerated rate in comparison to conventional breeding processes.52 These are often produced as the result of accelerated random plant mutations.53 It stands to reason that essentially biological products that occur through the sped-up evolutionary process that technical methods provide are likely to occur within nature or through conventional breeding processes in time. If this time falls within the scope of protection of the technically achieved patent the overlap will bring to the fore this currently unsolved issue.

Additionally, Article 4(2) of the Biotech Directive must be assessed before moving on to an analysis of EPO case law interpretation. This Article states that:

51 Directive 98/44/EC, art 8(1)
53 Ibid
“Inventions which concern plants or animals shall be patentable if the technical feasibility of the invention is not confined to a particular plant or animal variety”54

Once again the Biotech Directive refers to one situation with no inference as to the flip side of said situation. Here Article 4(2) states that plant products may be patentable if it is not confined to one particular plant variety. However, it is not stated whether this is to be interpreted that where the plant product is only applicable to one plant variety that it is not patentable. As shall be seen later, the beer cases in question pertain to grain mutations. Where these mutations occur within one specific genome area of a type of beer grain, it is likely that they fall within this Article as inventions that are confined to a particular plant variety, and are therefore not patentable. A greater understanding of the science behind this provision would be required to fully interpret the implications of the EPO’s current standing. Resultantly further interpretation guidance is required from the EPO in this area.

54 Directive 98/44/EC, art 4(2)
3. Case Law and its interpretation of European patent legislation

Beer grain patents have marked a focal point of the controversy attached to the area of plant patents and food chemistry is recent years. Food chemistry is as fast growing area of technical advancement and subsequently growing intellectual property protection, making it both an economic and legal area of interest. The more prevalently these plant patents are granted to products within the food industry, the greater scope of impact any changes to legislation and its interpretation have upon the industry, directly impacting “Breeders, farmers, processors, retailers and consumers” alike. With the advances that have occurred within the field of evolving technical processes for plant production has come the need for diverse and novel interpretation of European patent legislation. This has been seen not only through the implementation of the specialised Biotech Directive, but through the ever increasing number of cases before the EBA relating to food plant patents highlighting the holes that have become ever more present in legislative interpretation. Most notably, EPO case decisions have shone light on areas of plant patent legislation that have not been previously considered in the way in which evolving industry practices required them to be; in particular those questions unanswered regarding the relationship between a product and the process through which it was created, and the extent to which the scope of protection provided by these patents reaches.

These EPO cases of note include most prominently those of G2/07 and G1/08 (Broccoli and Tomato), G2/12 and G2/13 (Broccoli II and Tomato II), and the three EPO cases regarding the beer patents granted to Carlsberg and Heineken. These influential cases brought attention to the new ways in which European patent law is required to be interpreted.

55 “Among the top 20 technology fields, food chemistry (+10.9%), digital communication (+8.7%), materials metallurgy (+8.1%) and basic materials chemistry (+7.7%) witnessed the fastest average annual growth between 2005 and 2015. Food chemistry rose from around 22,400 published applications in 2005 to around 63,200 in 2015[...]”; from “World Intellectual Property Indicators 2017” pg. 36; from WIPO, “World Intellectual Property Indicators 2017” pg. 36; from https://www.wipo.int/edocs/pubdocs/en/wipo_pub_941_2017-chapter2.pdf, accessed 04-02-19
57 EPC 1973 and Directive 98/44/EC; for example EPO G2/07 and G1/08 [2010]
3.1 Broccoli and Tomato patents

The final element required to analyse beer patent is to undertake a more general look at recent plant patents must be undertaken. There are a number of prominent cases regarding patents on food stuffs, with examples including patents granted to melons, squashed and pumpkins; the most important here pertaining to tomatoes and broccoli. As stated previously, EU legislation is lacking when it comes to how the phrase ‘essentially biological processes’ is to be interpreted in practice. The debate regarding this phrase came before the EBA within cases G2/07 and G1/08, known as the Broccoli and Tomato cases, in December 2010, through which came clarification came from the EPO as to this plant patent issue.

The tomato case consisted of plant production through conventional breeding steps around the process of cross breeding, with the crossing of a Lycopersicon esculentum plant containing the targeted trait. Here the court referred back to the decision of the Lubrizol case, where although the only difference between the Lubrizol production processes and conventional breeding processes was the complexity, this was enough to qualify as no longer ‘essentially biological’. This was imposed in the decision of the tomato case, the decision stating that where the process contains a step that “[…] introduces a trait into the genome or modifies a trait in the genome of the plant produced” beyond that classified as a method of sexual reproduction it can be classified as a technical process. Additionally, the EPO stated that:

“[…] it is not relevant whether a step of a technical nature is a new or known measure, whether it is trivial or a fundamental alteration of a known process, whether it does or could occur in nature or whether the essence of the invention lies in it.”

59 EP1962578, Monsanto Invest, ‘Closterovirus-resistant melon plants’ [2011]; EP1973397, Syngenta Participations, ‘Novel Cucurbita plants’ [2018]; G2/07 and G1/08 (Broccoli and Tomato); G2/12 and G2/13 (Broccoli II and Tomato II); from Bostyn, ‘Resolving the conundrum of the patentability of plants produced by an essentially biological process: squaring the circle?’ (2013): 383-396;
It is worth noting that there are now oppositions pending against the melon and curcurbita (squash and pumpkin) patents.
60 Bostyn ‘How biological is essentially biological? (2009)
62 EPO G2/07, ‘Datasheet for the decision of the enlarged board of appeal’ (Enlarged Board of Appeal, 09-12-2010): 3
63 Ibid 4
This leaves the scope of what can be classified as a technical step – and subsequently a technical process – considerably wide. This decision in the Tomato case established a significantly wide scope of patentability, and narrowed the scope of patent exceptions as it was interpreted previously. With this decision, the ability to patent food plant products became more attainable.

It is important to note that within cases G2/07 and G1/08 the Board of Appeals stated that the element within a process that is considered technical must happen within the sexual crossing and selection stages of the process in order for it to be considered technical; with technical measures before or after the sexual crossing and selection not qualifying the entire process to be considered technical.⁶⁴

The decision of the Enlarged Board of the EPO further commented on this debate within the follow-up cases of Broccoli II and Tomato II in 2015.⁶⁵ Within the decisions of these cases it was once again reaffirmed by the EPO that exceptions to patentability are to be interpreted narrowly.⁶⁶ These cases cement the EPO’s attitude towards the importance of maintaining a broad scope to patentability, which is seen to be to the benefit of plant product producers. These later cases additionally focused on the question previously posed during the drafting of the Biotech Directive regarding the impact of a patent process classification on the products of these processes, stating that:

“In the circumstances, it is of no relevance that the protection conferred by the product claim encompasses the generation of the claimed product by means of an essentially biological process for the production of plants excluded as such under Article 53(b) EPC.”⁶⁷

This point is established on the basis of Article 3(2) of the Biotech Directive. Though this decision aimed to clarify the important of a products creation, it rather raised more questions regarding the scope of a patents protection. This point serves to say that as long as there is one viable technical method through which a plant product may be produced it is granted scope of protection over all iterations of this product where created through essentially biological methods. This does little to defend the argument for allowing patent protection to

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⁶⁵ G2/12 (Tomatoes II/State of Israel) OJ EPO 2016 and G2/13 (Broccoli II/Plant Bioscience) OJ EPO 2016
the products of technical processes regardless of their own merit for patentability, as it places the burden of proof onto the process rather than assessing the resulting product on its own merits. This decision allows products such as those within the Carlsberg and Heineken cases to be patentable automatically, regardless of whether the product – in this case mutations – are their self essentially biological or technical in nature. Here the issue with allowing interlinking between process and products in terms of patentability comes to the fore; an issue that is to be addressed during the analysis of the Carlsberg and Heineken cases.

As the cases of Heineken and Carlsberg come within this established EPO interpretation of a technical process for plant production, it is this form of patent product that shall be at play in subsequent analysis.

3.2 Beer patents

From a purely beer production perspective patents were traditionally more readily available to beer making devices and processes. As previously stated, beer recipes themselves can be patented where these can be displayed as a chemical formula, though these must meet the patent requirement of inventiveness. This is seen as difficult to achieve within the constraints of conventional breeding methods. Often, within the world of beer recipes this inventive stipulation is achieved through adding unlikely, non-traditional elements such as:

“Dogfish Head Brewing recently introduced a beer with garlic. And Ballast Point is currently serving a beer called “Red Velvet,” which is made with beets and chocolate.”

However, this focus on patenting recipes and production processes changed with the decisions of the EPO within the Broccoli and Tomato cases have widened the scope of patentability available to the plant products themselves which will be seen to have been taken advantage of within the cases of Carlsberg and Heineken pertaining to specific genomes. Though, with these advances plant patenting has become more prevalent, so too has expressed opposition to this subset of patents.

68 Andrew Chadeayne, ‘Can I patent beer?’ (Inventing Patents, 12-03-2016); from https://inventingpatents.com/category/beer-and-brewing-patents/ accessed 28-01-19
69 Ibid
The Carlsberg and Heineken cases have been seen to have acted as a catalyst for an onslaught of opposition driven debate, adding to that already expressed against food plant patents in general. This opposition shall be more substantially addressed in section 4, but the magnitude of opposition acts as an indicator of the importance of the Carlsberg and Heineken cases in the grander food patent debate.

### 3.2.1 Carlsberg and Heineken beer patents

Carlsberg and Heineken are two of Europe’s largest and market leading beer manufacturers, with Heineken alone owning more than 50% of the international beer market. The importance and influence of these companies should not be forgotten when trying to achieve a comprehensive understanding of the importance of these beer patent cases.

In 2016, Carlsberg and Heineken jointly applied to the EPO for three patents pertaining to their beer production; more specifically the patent draft aimed to protect specific grain mutations within the plants used in the companies’ production process. The granting of these patents is a precedent setting case with as yet largely unseen legal and economic ramifications. Where the Tomato and Broccoli cases widened the interpretation of the classification of technical processes, these beer patents established a wide scope of protection for these technically achieved plant products.

The first of the patents within this case, EP2384110, was granted to protect a beneficial enzyme mutation within a specific beer grain genome that created what the producer deems a better, more stable taste in the beer at a cheaper cost to the producer. The second patent, EP2373154, was also granted to protect a useful enzyme mutation with a specific beer grain genome that also made the malting process easier for the manufacturers. The original patents granted by the EPO gave the holders protection not only for the specific enzyme mutations outlined in the patent applications, but to all enzymes produced within the specific genome in question. Other enzymes that could be produced within these areas of the plant

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70 No Patents on Seeds!, ‘Factsheet: Patents on beer & effects’ (January 2019): point 1
were also covered by the patent, pertaining to the decision with the Tomato and Broccoli cases.\textsuperscript{72}

This decision by the EPO to allow the scope of protection of patents EP2384110 and EP2373154 to extend to all technically achieved enzyme mutations within this genome raised three major questions.

Firstly, to what extent the patent protection granted to a specific enzyme mutation was to extend to cover other technically produced mutations within the same genome; the narrower interpretation of an essentially biological processes used by the EPO would this occurrence statistically more likely. Secondly, the extent to which the scope of protection granted to these patents would include the same or sufficiently similar mutations derived from essentially biological processes. This question demonstrates the potential negative impact caused by this method of co-dependant process and product patentability classification. Finally, the previous question can be extended to include instances where the same or sufficiently similar enzyme mutations are found to have occurred ‘spontaneously’ in nature. Though no one will claim on behalf of ‘nature’, this does not change the fact that this would demonstrate that it may not be wise to consider these products patentable where based on the technical nature of their creation process rather than on their separate technical nature.

Firstly, was the scope of protection granted unnecessarily broad, causing potential conflicts with other technical inventions? Secondly, would this scope of protection be enforced against mutations within this genome which occur through essentially biological processes such as conventional breeding; even with the narrow interpretation of the essentially biological processes exception set out in the Broccoli and Tomato EPO cases?\textsuperscript{73}

This issue is of great importance within the field of plant patents. For the vast majority of patents conflicts arise only went a competitor copies or designs their product too closely to that which is patented. When it comes to plant patents though, there is the additional component of nature to contend with. The technical processes used to achieve patentable plant products can often be described as a ‘sped-up’ version of the conventional evolutionary process of plant mutation.\textsuperscript{74} Therefore, even leaving aside discussion of conventional breeding

\textsuperscript{72} G2/12 (‘Tomatoes’) and G2/13 (‘Broccoli II’) OJ EPO (2016): 28
\textsuperscript{73} No Patents on Seeds!, ‘Patent on beer’ from https://www.no-patents-on-seeds.org/en/patent-cases/beer accessed 28-01-19
\textsuperscript{74} No Patents on Seeds!, ‘Who invented beer and barely? EPO continues to grant patent on conventional breeding despite new rules’ (2018)
and essentially biological methods, it is logical to predict that with time these mutations granted patent protection will appear within nature.\textsuperscript{75} Though this issue arose in regard to earlier plant product patents, including the Broccoli and Tomato cases, it is extenuated within the Carlsberg and Heineken cases by the breadth of the scope of protection granted, statistically increasing the likelihood of conflicting mutations occurring.

The third patent in question, EP2575433, further accentuates this issue in question. The third patent granted to Carlsberg and Heineken specifically protects the combination of the beer genome mutations within further crossing and breeding, therefore further widening the scope of protection for these advantageous mutations to over any instance in which they are used in combination with other genomes. By gaining these patents (especially the third, EP2575433) the owners were granted the ability to prevent other competitors or barley growers from progressing and improving this genome in any form.\textsuperscript{76} This particularly wide scope of protection, and the mass of opposition to this decision can be seen as an important turning point in plant patent interpretation development.

\subsection{3.2.2 Carlsberg and Heineken Patent restrictions}

As a result of the onslaught of opposition to the patents granted to Carlsberg and Heineken, the case was reassessed by the EPO in October of 2018 resulting in restrictions as to the extent of these patents:

“The original patent covered barley from conventional breeding, that is to say plants bred without genetic engineering, and its use by the breweries. Now the patent is limited to those plants that have a certain mutation.”\textsuperscript{77}

The restrictions placed on these patents by the EPO tackled one of the main issues raised by the original decision by reducing the scope of protection granted from the larger area namely the whole genome of the plant in which the targeted mutation occurred to only the enzyme mutation. Resultantly, were different mutations to be created by other parties through either

\begin{itemize}
\item \textsuperscript{75} No Patents on Seeds!, ‘Factsheet: Patents on beer & effects’ (2019): point 1
\item \textsuperscript{76} No Patents on Seeds!, ‘Factsheet: Patents on beer & effects’ (2019): point 1
\end{itemize}
technical or essentially biological processes within the same area of the plant, these will no longer be in conflict with Carlsberg and Heineken’s patents.

Though this restriction of the scope of protection of the patents does go some way towards answering the question raised about the initial patents regarding conflicts between them and other technical plant inventions, there is still a lack of instruction as to how conflicts between these beer patents and significantly similar mutations occurring through essentially biological methods would be addressed by the EPO and EBA. Opposing parties to these patents have, however, continued to vocalise their opinion on these cases even after their restrictions of scope of protection. Organisations like No Patents of Seeds! are still of the opinion that the precedent set by these beer cases does not go far enough in establishing the boundary between patented plant products and their counterparts within conventional breeding. For this statement to be assessed, a wider look at the impact of granting these beer patents may have, legally and beyond. To fully understand this sentiment, the driving concerns behind it must be understood, beyond merely the legal debate outlined previously.

### 3.3 Opposition to beer patents

Upon granting the patents to Carlsberg and Heineken the EPO received a great deal of backlash, similar to that presented to previous plant and food patent grants from those affected by the legal precedent set by the granting of such a type of patent including those within the industry; specifically opposition voiced by smaller farmers and representative NGOs of farmers, being those more likely to be reliant on conventional farming processes and without the economic position to branch into the technical research and development available to larger companies such as market giants Carlsberg and Heineken. This opposition has been voiced largely through journalistic interests and the webpages and activism of charitable NGO’s such as No Patents on Seeds! and Friends of the Earth with statements such as those made by one such representative Erling Frederiksen, stating that:
“There should be no patents on beer and barley. Breeding plants and brewing beer are not inventions, but based on centuries-old tradition.”

One particularly invested non-government organisation No Patents on Seeds! led the formation of a group of over 40 organisations, many of which are based in and around Germany as a result of the density of smaller beer producers in the area, some of those most likely to be negatively impacted by the granting of patent to beer. Part of this opposition was in the form of a physical protest in German with roughly 100 protestors present. The combined efforts of these organisations petitioned against the decision of the EPO to grant patents to areas of plant that they considered should be considered conventional breeding and not permitted to hold patent protection. Additionally, these organisations jointly appealed to Carlsberg and Heineken directly to voluntarily rescind their patent applications, both before and after the EPO’s restrictions of the scope of the beer patents.

It is thought by this opposition that in granting these patents the EPO are in direct violation of EU law and that the precedent created by these resulting patents will grant disproportionate monopolies to the two industry parties involved. Though the EPO later reduced the scope of protection given to the Carlsberg and Heineken patents those opposed still feel like further steps should be taken to correct what they view as a misstep in the interpretation of patent law. Opposition has been presented that the granting of these kinds of patents is directly in contradiction of the standards set out by the EPO as well as current EU law. The basis of discussion occurred partly from the lack of distinction regarding what constitutes a patentable

79 Arbeitsgemeinschaft bäuerliche Landwirtschaft (AbL), Arbeitsgemeinschaft der Umweltbeauftragten der Gliedkirchen der Evangelischen Kirche in Deutschland (AGU), Arche Noah Österreich, Bioland, ARGE Schöpfungsverantwortung Österreich, Brot für die Welt – Evangelischer Entwicklungsdienst, Bündnis gentechnikfreie Landwirtschaft, der BUND Naturschutz Bayern (BN), Bund für Umwelt und Naturschutz Deutschland (BUND), Bundesverband Naturkost Naturwaren (BNN), Campact, Copenhagen Food cooperative Dänemark, Die Freien Bäcker, Evangelischer Dienst auf dem Land in der EKD (EDL), Erzeugergemeinschaft für ökologische Brauholzstoffe (EZÖB), Erzeugergemeinschaft Bördeland und Diemetal, FIAN, GAIA Portugal, Gää e. V. – Vereinigung ökologischer Landbau, Gen-ethisches Netzwerk (GeN), HORIZONT3000 Österreich, IG Milch Österreich, IG Nachbau, Katholische Landvolkbewegung (KLB), Kein Patent auf Leben!, No Patents on Seeds!, NOAH – Friends of the Earth Denmark, Plataforma transgénicos fora Portugal, Pro Regenwald, ProSpecieRara Schweiz, Sambucus, Save Our Seeds!, Slow Food Deutschland, Swissaid, Umweltinstitut München, Verband Katholisches Landvolk (VKL), Welthaus Diözese Graz-Seckau Österreich, WeMove.EU, Zivilcourage Rosenheim und Miesbach as well as Zukunftsstiftung Landwirtschaft.; from https://www.no-patents-on-seeds.org/en/patent-cases/beer accessed 28-01-19
81 No Patents on Seeds!, ‘Scope of patent on beer reduced after opposition’ (02-10-2018), from https://www.no-patents-on-seeds.org/sites/default/files/2018-10/PR%20hearing%20patent%20on%20beer_0.pdf accessed 28-01-19
plant invention and the extent to which this patent protection extends. In response to this opposition spokesperson to Heineken John-Paul Schuirink stated in an interview that:

“The barley raw materials are patentable because of the techniques used in the process to obtain these specific barley traits” and that “They are not a patent on a discovery of a specific type of barley”.  

The argument of this opposition centres also around the advantages to these larger companies from these legal monopolies. In response, Carlsberg representative Birgitte Skadhauge has spoken out in defence of the inventive steps required in the acquisition of these mutations that in the opinion of Carlsberg, the EPO should allow their patents to be considered differently from essential biological processes. Additionally she states that the restrictions places on the patents have opened up the possibility for competitors to targets enzymes in the same area of these plants with similar properties as those protected by Carlsberg and Heineken’s patents without the time and costs of research and development that were invested by these companies.  

This is not a special occurrence because of the restrictions placed on the patents. As with almost all – if not all – areas of patent protection, the act of ‘designing’ or ‘inventing’ around patents occurs by competitors.

Beyond this, debate from opposition regarding the wide impact of beer patents falls within four categories; legal implications, economic industry change, agricultural biodiversity worries, and the question as to the morality of patenting beer.

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To fully understand the impact of the granting of the Carlsberg and Heineken beer patents a wider understanding of the areas directly affected by the EPO’s decisions must be obtained, including both the legal implications as well as the more extensive effects on the industry itself. The pivotal case of Carlsberg and Heineken not only changes the way in which intellectual property law is interpreted, but the subsequent ways in which intellectual property protection is used within the industry of beer and wider food plant products:

“These include the interests of farmers in remaining free to reuse seeds on their own holdings,\textsuperscript{84} and the interests of society in maintaining genetic diversity and ensuring equality and distributive justice between countries at different stages of scientific, industrial, and social development.\textsuperscript{85,86}"

Resultantly, in order to completely understand the impact of granting such beer patents, the economic, agricultural and moral impact of such a decision should be analysed; all three of which have been vocalised by opposing parties to the defining decisions of the EPO in this area of the law. As the decisions of the EPO here are relatively recent, to analyse the probable changes instigated by these decisions they shall be compared with similar plant patent legislation interpretation within other jurisdictions. This cross-jurisdiction comparison can provide insight into how the monopolies provided by food plant patents can impact the wider food production industry.

The economic impact of the granting of such patents plays predominantly into the worries of those also active in the beer industry, particularly smaller businesses or producers that are often the first to be negatively affected by the economic advantages of larger players in their field. The economic worries voiced regarding these patents are not unusual in relation to the benefits granted by patents; this, however, does not discount them from warranted attention. Additionally, there are concerns that the granting of beer patents will negatively affect agriculture; expressed largely by NGO’s like Greenpeace and once again \textit{No Patent’s on Seeds!}. This pertains to biological conservation and the protection of biodiversity within the

\textsuperscript{86} Pila & Torremans, European Intellectual Property Law ( 2016): 221
field of beer grains. It is thought by this opposition that the limitations placed on biodiversity created by plant patents will both enforce and encourage a lack in agricultural diversity. The question of the agricultural impact of beer patents shall be undertaken through analysis of comparative areas of agricultural manipulation within Europe and other jurisdictions.

Lastly, opposition has also been voiced pertaining to the possible moral and ethical issues with allowing the protection of plants and more specifically food crops. The legal position of moral opposition across Europe and pertaining to the EPO should be understood before an analysis of its interpretation within this specific field can be fully analysed.

4.1 Legal implications

The decisions in both the original Carlsberg and Heineken patent grants and the subsequent restrictions of these patents’ scope of protection have added to the legal foundation of food patenting. In their original state these beer patents established a precedent for the granting of patents which cover a wide scope of protection to all mutations within a specific area or genome of a plant, rather than merely the mutation in question. However, the subsequent restrictions reversed this widening of plant patent scope of protection. This does still leave legal questions highlighted within the cases regarding how conflicts between these patented, technically produced plant mutations and those same or similar plant mutations occurring later through essentially biological processes or within nature itself. The debate regarding whether or not the law should remain that patents may be granted to the products of technical processes continues, including the question of whether or not these patents should be allowed to extend in their scope of protection to cover these same or sufficiently similar products created through differing essentially biological processes. The EPO has yet to provide guidance sought after the Carlsberg and Heineken cases as to the interpretation of current legislation regarding what the legal approach will be to mutations identical or significantly similar to those protected by these patents that have been obtained through essentially biological processes, or even unintentionally.88

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87 No Patents on Seeds!, ‘Factsheet: Patents on beer & effects’ (2019): point 3
88 No Patents on Seeds!, ‘Factsheet: Patents on beer & effects’ (2019): point 1
There is also still the issue raised as to the monopoly created with the granting of these patents in relation to the market share already possessed by the patent-holders in question.  

Additionally, the monopolies granted to Carlsberg and Heineken are for specific beer grain mutations. In and of themselves, these monopolies are unlikely to provoke legal issues pertaining to competition law. Further discussion of the advantage of these beer patents extends beyond the law into the implications, including those of an economic nature, within the beer production industry of allowing patent protection for beer.

4.2 Economic and industrial impact

As with any area of business, the ability to protect or not or lack thereof has a direct impact on the way in which players in the industry operate, which subsequently impacting the industry’s economics.

Firstly, Carlsberg and Heineken control the large majority of the beer market, with Heineken alone controlling 50% of the beer market internationally. As a result, any cooperation between these two traditionally competing companies creates an imposing force within the industry. Can the act of joint application by these two industry forerunners be seen as an attempt to create a significant industry monopoly? At their core patents grant the rights holders a monopoly for their product or process and as an incentive to invest into more expensive areas of research in return for publishing all information regarding the patented invention to be used to the advantage of the entire industry after the patent’s expiration. The question that is raised by this is whether by allowing a monopoly on grain mutations to companies already within a dominant market position is within the realm of incentive that is intended by patent rights, or whether by allowing patents to be granted to market forerunners goes too far in intellectual property protection. Though the patents granted to these two companies by the EPO are limited to specific beer grain mutations, and therefore in and of itself is a very limited monopoly, it can be argued that this merely marks the beginning of the potential control granted by plant patents. Though the patents granted to Carlsberg and

89 Stage, ‘Carlsberg og Heineken får indskrænket patenter på muteret byg’ (www.ing.dk, 2018)
90 No Patents on Seeds!, ‘Factsheet: Patents on beer & effects’ (2019): point 1
Heineken are limited in their scope, it is useful to understand the wider perspective of plant patent monopolies. The industry of beer production cannot rely on the same reasoning as say pharmaceuticals as to why the monopolies granted to them with patents should be allowed; monopolies such as those originally granted to Carlsberg and Heineken from the EPO. Such economic advantages should – and shall – be evaluated both in terms of competition law as well as other legal factors that go into informing the overall decision of if these patents should be granted; all advancing an answer to the question of the overall ‘legitimacy’ of beer patents and whether this legitimacy should be place under questioning by the EPO again.

Within most industries, though patents grant the owner a form of small monopoly, the existence of patents acts as encouragement for competitors to ‘invent around’ them; to improve and stimulate competition rather than stifle it.\(^92\) However, in the same way that pharmaceutical patents have given rise to big production companies becoming market giants, the increasing availability of food patents is able to further market forerunners to the ever increasing detriment of smaller farmers and businesses. This furthering of advantages to larger businesses in possession of beer patents is helped by the questionably wide scope of protection granted to the patents of Carlsberg and Heineken.

### 4.2.1 Seed patents internationally

These so called seed monopolies are not a novel concept, which have occurred in jurisdictions such as India and the US where extensive intellectual property protection of seed and plant patents has occurred, leading to disproportionately large market leaders.\(^93\) The expansion of plant patentability as seen in part through food patent EPO case law within Europe has been seen in part in order for European patent protection, specifically within the field of biotechnology, to maintain competitiveness with leading powers in the field like Japan and the US where this area of patent law is more developed than its European counterpart.\(^94\)

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\(^92\) Rene D. Tegtmeyer (US Assistant Commissioner for Patents), ‘Patents and the Constitution: Transgenic Animals: Hearings Before the Subcomm. On Courts, Civil Liberties and the Administration of Justice of the House Comm. on the Judiciary, 100’ (Cong., 1” Sess. 27 (1987) pg. 8


The impact of these seed and food patents within the US can be described as follows:

“In 1996 there were 600 independent seed companies operating in the US. By 2009, this number had shrunk to 100, and by 2016 the ten biggest seed sellers controlled 75% of the global market” 95

This decrease in seed companies can be seen to directly correlate with the increase in patent protection. 96 This effect of increased plant patent protection is not limited to only the US. Internationally, there have emerged six leading agricultural companies – Bayer, Syngenta, Monsanto, BASF, Dow Chemical and DuPont - possessing control of the majority of the industry, possessing control of:

“[...] 63% of the world’s commercial seeds and 75% of global agrochemicals”. 97

This growth in the gap between the increasingly large market leaders and smaller producers is an indicator of how the seemingly small monopolies granted by individual patents can impact the economics of the plant and food production industry. Though admittedly plant patents cannot be the only factor in this change, it plays a notable part. The effect of seed patents out-with Europe encompass some of the issues put forward by those opposed to plant patents within Europe, though arguably more drastic in nature in relation to the current European plant production industry situation.

4.2.2 Smaller farmers and producers

The impact of these patents on smaller farmers and producers is a concern shown both out-with Europe and within internal opposition such as that demonstrated in Germany. 98 This example of the industry impact generated by plant patents is demonstrated by Vandana Shiva the Indian environmental activist and scholar who states the:

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95 Camilla Hodgson, ‘Monopoly and Monoculture’ (Weapons of Reason, Issue 5, 2018)
96 Shiva, ‘The GMO Emperor has no clothes’ (2011)
97 Hodgson, ‘Monopoly and Monoculture’ (2018)
“These IPR monopolies on seeds are also creating a new bondage and dependency for farmers who are getting trapped in debt to pay royalties”.99

Adding that:

“[…] it also allowed them to threaten farmers who strayed outside the rules with legal action, including a ban on farmers saving patented seeds from one season to the next. Instead, they had to buy new seeds every year”.100

Smaller farmers are impacted economically by the need to pay licencing fees and royalties for the uses of patented plants and animals. This situation can lead to larger corporations pushing smaller farmers out of the industry and out of business.101 Even by just applying for these patents Carlsberg and Heineken could have the effect of dissuading smaller brewing companies from trying to produce similar products or using similar methods in anticipation of the patents. Upon the granting of these patents these two companies can have the effect of intimidating competitors from straying too close to their patents, as they jointly have much greater resources at their disposal with which to defend against such actions. This factor of smaller plant producers being detrimentally impacted by plant patents feeds into subsequent future implications, such as its impact upon both industrial and biological diversity.

4.2.3 Wider industry implications

The increase in centralised market leaders, as has been seen as a result of increasing food patents in jurisdictions outside Europe can lead to wider economic implications. These implications are described once again by Vandana Shiva who stated that:

“The first impact is a seed monopoly and the disappearance of diversity. The second impact is increasing costs. The third impact is higher use of chemicals. The fourth impact is the denial to consumers of the right to know what they are eating.”102

This is an example of some of the affects – from rising food prices due to lack of competition, of diversity, and beyond to chemical changes – that are predicted as ultimately probably results of a change that begins with the increase in plant patent grants. Though this

100 Hodgson, ‘Monopoly and Monoculture’ (2018)
102 Confino, ‘Vandana Shiva: corporate monopoly of seeds must end’ (The Guardian)
appears to be a stretch of the current situation, with only specific mutations being granted patent protection to Carlsberg and Heineken, it has been seen in other jurisdictions that these predictions are not unfounded. Economic changes to an industry embody the fears of those within it to the legal changes that have been taking place. Though the EPO has stated that it is not their place to assess the pros and cons of plant patents beyond the legal framework within which they operate, these wider implications of this developing field of law must be taken into account to avoid the fold-out monopolistic changes this legislative interpretation may have on European beer grain – and food plant in general – protection.\textsuperscript{103} Once such prediction, that plant diversity will disappear, will be assessed next.

### 4.3 Agricultural impact

Changes to the economics of the beer production industry are not the only area in which a marked increase in food plant patents are likely to have an negative impact here beer gain, and subsequently wider plant, agriculture; the question here being what the ecological and agricultural impact of the limitations caused by plant patent will be. The most commonly addressed issue within this scope is that of biodiversity. From the granting of patents, limitations are placed on the availability of these particular crops; a leading cause of lack of biodiversity. As seen previously, by allowing for plant patents, incentive is created for producers to strive towards plant products that fall within this form of intellectual property protection; it is of economic interest for producers to gain protection for these superior strains and mutations of beer grains. This commercial advantage promotes the limitation of the biological diversity of these grains. Carlsberg and Heineken are among those protecting and subsequently promoting the use of this more limited range of beer grains. This limitation can come in the form of limiting those to whom grains are available to, or through the owners of these grains limiting their crop production to only these patent protected ‘superior’ grains; both such limitations pose their own problems to overall agricultural diversity, though in most cases both forms of limitation are not seen in isolation.

\textsuperscript{103} T 0356/93 (Plant cells) [Greenpeace Ltd. v. Plant Genetic Systems] OJ EPO 1995, 545
The limitation of grain diversity has widely accepted negative effects; with wider a range of crop varieties is considered essential in the protection of crop resistance to disease and pestilence.\textsuperscript{104} Diversity amongst plant strains is promoted as a vital part of effectively avoiding issues such as specialised diseases. Where biodiversity is not seen within the agriculture of the crops, or any plant family negative effects are seen:

\begin{quote}
“Given reduced diversity, crops are less resistant of adapting to diseases or changing environmental conditions and could cause crop failure. Resilience to stress periods might be lost due to less variety.”\textsuperscript{105}
\end{quote}

Additionally, these negative effects are not seen to be limited to single crop rotations:

\begin{quote}
“This reliance on only a few crop varieties is potentially dangerous in the long term: diversity in the natural world and access to a variety of seeds with different traits and resistances is vital, particularly in the context of climate change.”\textsuperscript{106}
\end{quote}

It is widely agreed that with a decrease in the variety of plant strains in crop rotation the higher the chance of detrimental effects becoming present is. This is however not limited to those strains of plants created through technical processes. The negative impact of limiting the pool from which crops are chosen is not determined by the processes through which the plant strains where achieved. The negative impacts of limited biodiversity are likewise not limited to the crop group being limited by patents, in this case beer grains, with wider knock-on effects within the biosphere. These negative impacts are something that may not be possible to reverse once they have occurred, making pre-emptive assessment ever more important.

The defence rebuttal against the argument of the detrimental effects on biodiversity of limitation is that this issue is not limited to those plants protected by patents.\textsuperscript{107} Though this is true, that traditional breeding methods encourage the specialisation and restriction of strains used, this is accelerated through the advanced evolutionary method created by technical processes. Additionally, the broad scope of interpretation of the classification of technical

\textsuperscript{104} FAO Commission on Genetic Resources for Food and Agriculture, ‘The state of the world’s biodiversity for food and agriculture’, J. Bélanger & D. Pilling (eds.) (Food and Agriculture Organization of the United Nations, 2019)
\textsuperscript{105} No Patents on Seeds!, ‘Factsheet: Patents on beer & effects’ (2019): point 3
\textsuperscript{106} Hodgson, ‘Monopoly and Monoculture’ (2018)
\textsuperscript{107} As stated by the EPO’s Opposition Division; from Gitter, ‘Led astray by the moral compass’ (2001): 23
processes brings the issue of biodiversity ever more into the scope of patents, and therefore much be taken into consideration together.

Further analysis of plant producers may reveal that this limitation posed by plant patents will encourage separate producers to use different strains as they cannot used those covered by others patent protection, therefore encouraging biodiversity. However, at present there is no evidence to support this supposition, due to the recent nature of these wider scope plant patent cases. Overall, although the impact of selective and restrictive biodiversity can be achieved as a result of both technical process plant products and conventional breeding, it can be accentuated through the protection and status of importance connected to the granting of patents as shown within the cases of Carlsberg and Heineken.

4.4 Moral questions

The final area of discussion regarding the wider impact and debated pertaining to the granting of food plant patents is that of the moral implications of enforcing limitation for a product that is integral for human existence. Though beer is not vital to survival, it represents the advances of patent protection for all food plant products.

Firstly, it should be understood that although an argument could be made for a comparison between food and pharmaceuticals in terms of warranting patent protection, with both of importance to the public, with both for example having the ability to apply for extended SPC protection, there is contention regarding whether these two areas can justifiably be compared when it comes to the need to protect them. Though there are clear benefits to protecting pharmaceuticals including providing incentive for development and funding, there is not this same need within the field of food patents. Though patents do provide incentive for producers to advance the plants they are producing, there are other methods of this occurring through conventional breeding methods, though admittedly at a slower rate. As a result, there is not the same need for patent incentive as with pharmaceuticals, and a comparison here between the two with regard to the greater need for the products by society is unbalanced. There is not the same need to promote plant product patents as pharmaceuticals that would outweigh the negative impacts outlined above.
The agreement against food plant patents is based on Article 53(a) of the EPC and Article 6 of the Biotech Directive, both of which subsequently state that patents are not available to inventions that go against public order or morality. It is worth noting that although not directly applicable this sentiment is mirrored within the CPVR to the same effect but within the field of plant varieties. This ethical dimension to European patent law that doesn’t exist in other jurisdictions like US patent law was one of the main objectives to be incorporated into the Biotech Directive. The fact that essentially biological plant and animal varieties are prohibited from patent protection can be seen as the implementation of this moral ground against human profit from natural phenomena. However, the interpretation of this ground is less cut and dry than it would seem when placed in the context of technically produced plant products.

As with the term ‘essentially biological processes’ as discussed earlier, the definition of what does and does not come within the term ‘moral’ is left lacking within the Biotech Directive. Resultantly, and in conjunction with the opposition raised within this area, this is worth analysing.

There are two ways in which this moral clause of the Biotech Directive can be interpreted; these are referred to as the ‘public abhorrence’ and the ‘unacceptability’ interpretations. The former implementation method comes from the case Lubrizol Genetics of 1992 relating to the isolation of gene tissue from pregnant women, stating that:

“A fair test to apply is to consider whether it is probable that the public in general would regard the invention as so abhorrent that the grant of a patent right would be inconceivable.”

This method of interpretation of the Biotech Directive is mirrored within the statement of two of the former UK Patent Office comptrollers who had been involved with the creation of the EPC stating that:

110 EPC 1973, art. 53(1); Directive 98/44/EC, art. 6; from Gitter, ‘Led astray by the moral compass’ (2001): 2
113 T 0320/87 (Hybrid plants) [Lubrizol] OJ EPO 1990, EPOR 71
114 Ibid
“[...] the morality exception ought to be invoked only where it is virtually "inconceivable" that the invention could be put to a moral use and the invention is clearly "abhorrent".115

Alternatively, the ‘unacceptability’ interpretation of the law comes from the Harvard/Onco-mouse case from the same year as Lubrizol.116 The Harvard/Onco-mouse case pertained to the insertion of a specific human gene into a mouse making it more susceptible to breast cancer. In this instance rather that public abhorrence to the patented invention the court merely looked for the disadvantages of granting a patent to extend beyond the advantages to warrant it immoral.117 Resultantly, the ‘unacceptability’ interpretation can be used where the ‘public abhorrence’ has failed to be applied.118 Because of the difference in stringency between these two tests for morality, depending on the approach used there will be different interpretations of what is and is not patentable.

In addition to this inconsistency of interpretation methods of Article 6, there is no harmonized definition of morality between European member states; with morality being determined through individual European institutions, as decided in the Greenpeace Ltd v. Plant genetic systems (PGS) case which pertained to genetically engineered herbicide.119 The Greenpeace case also established that this same method of morality testing seen in the Harvard/Onco mouse cases could be used with regard to plants. This case additionally showed that the ‘unacceptability’ test can be used against a decision where the ‘public abhorrence’ test had already been used.120

Though there has been opposition raised against the Carlsberg and Heineken beer patents on grounds of morality, it can be seen that these beer grain patents granted to do not fall within the scope of either public morality interpretations as they are currently understood.

Though within the PGS case the decision stated that protection of the environment did indeed fall within the classification of public policy, there would need to be sufficient evidence to

115 Edward Armitage & Ivor Davis, Patents and Morality in Perspective (Intellectual Property Institute, 1994);
116 T 0315/03 (Transgenic animals) [Harvard/Onco-mouse] OJ EPO 1992, 588
118 Ibid: 21
support the claim that the environment would be damaged. Additionally, the EPO appeal board in the PGS case stated that:

“The EPO would only interfere were the invention so abhorrent to the vast majority of the public as to render the granting of a patent inconceivable”.

The EPO appeal board stated that it was not within their remit to assess the ‘pros and contras’ of the specific area of genetically engineered plants in terms of morality; rather than they were to analyse the case in terms of ‘abhorrent’ risk with:

“The assessment of risks and the consequent regulation of the exploitation of the invention were a matter for other bodies to consider”.

Through this decision, the EPO made it apparent that although they will assess the possible negative impact upon public policy of individual patents, they feel that it is not their place to cast a wider, holistic judgement upon issues with such scope as that of the morality, or additionally the related agricultural damage, of patenting food. This has left those opposed to plant and food patents, including Georg Janssen, chairman of AbL association of German farmers, feeling that this decision goes too far in limiting opportunities in favour of particular industry players including Intellectual property and patent lawyers. This opposition continues to argue that the moral limitations do not go far enough to protect ‘the public interest in food security’ violations.

Overall, though there are many that use the argument of public interest and morality against the limitation of food production through patents, there is not sufficient legal basis through either the ‘unacceptability’ or ‘public abhorrence’ criteria for this argument for it to be further pursued at present.

125 Åsmund Bjørnstad, ‘’Do not privatize the iant’s shoulders’: Rethinking patents in plant breeding’ (Trends in Biotechnology, Vol. 34, No. 8, Aug 2016): 610
5. Conclusion

The discussion around plant product patents is still a fairly new point of legal contention, with ever advancing technological processes and techniques calling for continued evaluation and re-evaluation of European legislation and its interpretation. Specifically within the field of food plant patents there are a number of recent EPO cases – including most prominently those relating to tomatoes, broccoli, and beer – that have brought to attention questions left unanswered by European patent legislation; namely within the EPC and Biotech Directive.

From a legal perspective, the cases pertaining to the beer plant patents granted to market leaders Carlsberg and Heineken in 2016, bring focus to questions regarding the patentability of plant products, and the way in which the classification of a process impacts the patentability of the products and and the scope of that protection. In answering these questions, the court once again looked back at the understood interpretation of the term ‘essentially biological processes’ in Article 52 of the EPC and Article 4(1) of the Biotech Directive, stating that this term should be interpreted narrowly. There are still unanswered questions regarding this interpretation, specifically regarding what is to be included as qualifying levels of human intervention within the production process to warrant the classification of ‘technical process’, this being the understood boundary between the classifications of ‘technical processes’ and ‘essentially biological processes’.

Subsequently, bearing in mind the narrow interpretation of the term ‘essentially biological process’, questions remain regarding the impact of the classification of a process upon the patentability of its products. More recently EPO patents have been granted to food plant products, regarding food stuffs such as melons and tomatoes, which are the results of processes that may be considered essentially – thought not entirely – biological. Presently these products maintain their patent protection though opinions both of those generally opposed to food patents and some legal scholars think that the patentability of a product should not be directly related to the patentability of the process through which it is created. Further EPO interpretation regarding this issue is required.

The granting of plant patents to Carlsberg and Heineken is of importance to the general understanding of plant product patents, as it re-enforces the position of the EPO regarding the narrow scope of interpretation of exceptions to patentability, specifically regarding
essentially biological processes and their products. Additionally, within these cases the court was forced to address questions regarding the scope of protection granted to plant patents; in their reduction of the scope of protection granted to Carlsberg and Heineken’s patents, the EPO showed that the limitations of plant mutation scope of protection had previously been interpreted too narrowly, granting protection beyond the mutations to encompass an entire genome. This marks a turning point in EPO interpretation of European legislation. Until the cases of Carlsberg and Heineken, the narrowing interpretation of the patentability exception for plant products allowed for more and more patent protection to food plants. The reduction of this protection in the case of beer marks a turning point in patent law interpretation away from the previously seen ever expanding scope of patentability for food plants. However, questions still remains unanswered as to the scope of patent protection when placed in contention with essentially biological process product and those occurring in nature.

Beyond this purely legal perspective, there remain many concerns regarding the ability to patent plants, specifically those for food plants. The debate around beer patents marks one recent example of the narrowing by the EPO of the interpretation of the exceptions. This resultant widening of the scope of patentability has only furthered the importance of assessing the wider economical, agricultural and moral debates surrounding the ability to patent protect foods.

Arguments have been raised regarding the issue of allowing monopolistic protection of these plants used for food. Though a relatively recent occurrence, there are examples of the negative impact of so called seed monopolies within jurisdictions outside of Europe. Companies working within the industry concerning plant seeds outside Europe can be seen to have taken full advantage of the benefits of the monopoly control patents provide, with a small number of companies gain control of these patents and subsequently taking over the majority of the market. Though opinion within Europe is that the very specific monopolies granted through patent protection are not able to cause such a negative effect to the overall food production and seed market, it would be a lapse in analysis to disregard the impact these same patents have had in other jurisdictions.

Furthermore, the biological impact of adding to the already existence industry culture of using a narrow range of seeds and plant strains that can be seen to have been caused by the superior protection granted by patents has yet to be fully understood. It is widely agreed upon that from a biological perspective it is unwise to narrow the scope of agricultural variety
within any given plant production industry, with the negative impact of such action ranging from increased susceptibility of plants to diseases, to subsequent lower overall yields and possible crop failures. Though the EBA has stated that it is not their place to assess this facet of plant product production, this must be fully assessed in regard to plant patents for this industry to continue responsibly.

Lastly, there remains the moral question regarding the ability to narrow the availability of food plants through the use of patents. Many opposed to plant patents have stated that they feel this to be a step too far away from the central purpose of patent protection, using intellectual property rights to limit the benefits and availability of food production to larger industry market share holders and the those working within the legal field of patents. Though there is no legal backing for this claim in terms of either the ‘public abhorrence’ or ‘unacceptability’ tests for morality, many smaller producers and players within the food plant production industry feel that there is still merit to the argument that to limit the production of food stuffs is immoral and against the best interests of the public.

Overall the Carlsberg and Heineken case marks a turning point in the industry of beer production, with the ability of companies to protect their products through patents to a greater extent than previously. However, from a legal perspective there are questions that remain unanswered that have arisen as a result of these influential beer patent cases. With opposition still present and active against the decision of the EPO to grant these patents, it is likely that this is not the end of the legal discussion, rather a continuation of the larger discussion of the legal area of food patents.
Bibliography

Legislation:

Council Regulation (EC) 2100/94 on Community plant variety rights [27 July 1994]


European Patent Convention 1973

International Convention for the Protection of New Varieties of Plants 1991


Secondary legislative instruments:


Case law:

G1/08 (Tomatoes/State of Israel) OJ EPO 2010

G2/07 (Broccoli/Plant Bioscience), OJ EPO 2010

G2/12 (Tomatoes II/State of Israel) OJ EPO 2016

G2/13 (Broccoli II/Plant Bioscience) OJ EPO 2016


T 0315/03 (Transgenic animals) [Harvard/Onco-mouse] OJ EPO 1992, 588

T 0320/87 (Hybrid plants) [Lubrizol] OJ EPO 1990, EPOR 71

EPO Patents:

EP1962578, Monsanto Invest, ‘Closterovirus-resistant melon plants’ [2011]

EP1973397, Syngenta Participations, ‘Novel Cucurbita plants’ [2018]


Books:

Edward Armitage & Ivor Davis, *Patents and Morality in Perspective* (Intellectual Property Institute, 1994)


Articles:

Åsmund Bjørnstad, ’’Do not privatize the iant’s shoulders’: Rethinking patents in plant breeding’ (Trends in Biotechnology, Vol. 34, No. 8, Aug 2016): 609 – 617


FAO Commission on Genetic Resources for Food and Agriculture, ‘The state of the world’s biodiversity for food and agriculture’, J. Bélanger & D. Pilling (eds.) (Food and Agriculture Organization of the United Nations, 2019)

Gillian Taylor, ‘Food for thought – patents protecting food-related inventions’ (Reddie &Grose LLP, 2016)


Sven J.R. Bostyn, ‘How biological is essentially biological? The referrals to the Enlarged Board of Appeal G-2/07 and G-1/08’ (European Intellectual Property Review, 31(11), 2009): 549-558


**Web articles and newspapers:**


Mie Stage, ‘Carlsberg og Heineken får indskrænket patenter på muteret byg’
(www.ing.dk, 18-10-2018): accessed 28-01-19

No Patents on Seeds!, ‘Factsheet: Patents on beer & effects’ (January 2019) from
https://www.no-patents-on-seeds.org/sites/default/files/201901/INFORMATIONSBLATT%20englisch.pdf
accessed 28-01-19


No Patents on Seeds!, ‘Scope of patent on beer reduced after opposition’ (02-10-2018), from https://www.no-patents-on-seeds.org/sites/default/files/2018-10/PR%20hearing%20patent%20on%20beer_0.pdf accessed 28-01-19


WIPO, ‘World Intellectual Property Indicators 2017’ pg. 36; from