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INVENTORS AND INTELLECTUAL PROPERTY IN AGRICULTURE

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"The right of an inventor to his invention is no monopoly. It is monopoly in any other sense than a man's own house is a monopoly"

Writings and Speeches of Daniel Webster, 1903, Vol. 15 p.438

"A patent is that which brings out from the realm of mind something which never existed before, and give it to the country"

Singer v. Walmsley (C.C.- Md., 1860) Fed.Cas. No. 12900

I. Legal Background of Intellectual Property

1. The traditional legal notion of public property is: that which is in the public domain or is subject to public trust, *res nullis* (things without an owner) and *res communis* (things belonging to all). In particular, the air, the sea and outer space have historically been considered as *res communis* - incapable of individual ownership, and therefore inappropriable, indivisible, imprescriptible and inalienable.

Traditionally, plants and animals were considered as *res nullis,* appropriable by all and susceptible to destruction. This mandated their protection and management in the common interest. (Edelman, B., Hermitte, eds. 1988)

The common factors are that: utilization must be peaceful, access must be open to those who have that right who, in turn, must respect the rights of others; sharing must be equal; and owing to its indivisible character, administration of that which is *res nullis* must be in the interest of the common welfare (Jager, K.De 1988 p. 183, Knoppers, B.M. 1991).

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The early history of the patent institution shows that, while most of the motives underlying contemporary patent legislation were already then considered, the relative weights given these respective motives differed considerable from those during the system's later evolution. The fact, that most motives behind contemporary patent legislation existed already several centuries ago, may indicate that the developments of the late eighteenth century, with their heavy emphasis on the "natural rights" of inventors, were a passing thing rather than the birth of the patent institution.

Until fairly recently it was generally believed that patents for inventions originated in England in late sixteenth century and were later introduced in other countries as a mere imitation of an English institution (Frumkin, M. 1947). It can be explained by the fact that patent granting has always been linked to the idea of industrial progress, which was generally not existent during the period *prior* to the sixteenth century.

One outstanding exception was the situation of the Italian city-states of Florence and Venice. The former is generally credited with issuing the first patent for an invention in 1421. In Venice, that first patent grant, showing all the features of a modern patent for invention, was given in 1443.[1] From that date on, an

[1] According to Frumkin, it was a real invention patent, as good in subject matter as any of those dealt in 1947 by the British Patent Office.

increasing number of patent grants were recorded. In 1474 the Venetian Patent Act was enacted (Prager, F.D. 1944).

Its preamble reads in part:

> And if it were provided that others may not make nor take unto themselves, to increase their own honour, the works and artifices they may have seen so discovered /.../ such men would use their minds, and would discover and make things, which would be of no little utility to our state.

and the law states that:

> It is enacted by the authority of the present council that whoever will make in this city any new and ingenuous artifice, not made previously to our State, will be obliged to register it at the Office to our prov-editors of the Commune /.../. It shall be forbidden to anyone else in any our land and place to make any other artifice to the image and similarity of that one without consent and license of the author during the term of ten years /.../.

The texts quoted above show that the Venetian patent law contained the essential elements of any contemporary patent law. Of the four motivations usually said to underline the patent institution, i.e. utility to society, encouragement of inventive activity, refund of costs incurred by the inventor, and the inventor's right to the fruit of his mind, all are already present in this old Venetian Act (Prager, F.D. 1944).

In this preponderant economic interest of society, together with the absence of any specific reference to an unqualified right of the inventor to protection, that makes the Venetian Patent Act such an interesting precedent of modern patent law.

Essential feature of the patent institution is the right, sometimes referred to as the "inherent right", of the inventor and his invention. This philosophy has created the term "immaterial property rights" to express man's right to the creations of his mind, including inventions. Against the background of the Venetian law, the development of the idea of "immaterial" or, as they are also called "intellectual", property rights, is clearly seen as a latter occurrence. That the Venetian patent system a century later slowly fell into disuse was certainly an effect of rather man a contributory cause to the economic decline of the City State. The same development appeared in the early German experience with the patent system (Frumkin, M. 1955 pp. 46-49).

The patent institution first spread to Germany in the Empire as well as in the particular states from the Italian city-states. It later made its way to Holland, Belgium, France and England in that order. The German experience seems to be the only one which an established system grew up before the England Statute of Monopolies was enacted in 1642.

One of the purposes of the English Statute was to encourage its citizens to bring in foreign technology for the benefit of the national economy. The some consideration was also to play an important role in the American and French patent systems, which were introduced in the last decade of the XVIII century.

In the United States the patent institution first appeared in statute form in Massachusetts (1641) and Connecticut (1672). Both took their inspiration from the English Statute of Monopolies, emphasizing society's interest in such protection.[2]

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[2] On the natural right of the inventor Madison said that the author's copyright was solemnly recognized as a part of the Common Law in Great Britain, and that the right to useful inventions seems with equal justice to belong to the inventor. The problem of reconciling the interests of the individual and society

Shortly before the passing of the Patent Act of 1790, President Washington, in a speech to Congress, concerning the Patent Act, said in part:

> The advancement of Agriculture, Commerce and Manufactures by all proper means will not, I trust, need recommendation, but I cannot forbear intimating to you the expediency of giving effectual encouragement as well to the introduction of new and useful inventions from abroad as to the exertions of skill and genious in producing them at home. (Washington, G. 1936, p. II).

The importance put on facilitating the importation of foreign inventions is particularly significant.

The different theories on patent rights, which have appeared since the end of the eighteenth century, cannot be directly derived from the evolution however, certain parallels exist,. Such a comparative analysis is of interest for several reasons. The theories on the proprietary nature of patent rights have considerably influenced the patent doctrine; putting the emphasis on the powers conferred by property rights and not on the objects of such rights, similarities, as well as dissimilarities, between the two groups of rights become obvious; such similarities can be observed notably in contemporary compromises between private and social interests.

For all the persistent efforts made to link patent rights to the personality of the inventor, the evolution of practical considerations as to the justification of the patent institution has moved parallel to that of the private property doctrine. In private law the notion of private property rights being subjective rights or simple prerogatives has been replaced by the idea of private property rights. The same is fundamentally true for industrial property rights. These rights ought not only to serve the interest of title holders but also those of the community, subject also to considerations of national and international economics. Industrial property rights, formerly the exclusive concern of private law, are now regulated by various provisions of public law.

This apparently signifies a return towards the original considerations underlying the patent institution, i.e. those existing before the end of eighteenth century, namely that the state granted patent privileges on the basis of their expected social usefulness.

It is generally admitted today that the patent institution has its principal, if not sole, justification in the economic interest of society.

II. General Remarks on the Contemporary Inventive Activity

At the time when the American and French patent laws were introduced and during most of the last century, when national patent laws were passed in the western world, the position of the inventor and the organization of inventive activity were clearly not what they are today. The inventor at that time was an individual, self-taught, working on his own projects, generally financed by his own resources, and exploiting the results himself.

In order to find out the extent to which circumstances surrounding inventive activity have changed, the following three questions might be asked:

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coincides in both cases, i.e. copyrights and patents, completely with the claim of the individuals. D. Webster says: "The Constitution does not attempt to give an inventor a right to his invention //. No such tiling. But the Constitution recognizes an original, pre-existing, inherent right of property in the invention, and authorizes Congress to secure to inventors the enjoyment of that right." (Fox, H.G. Monopolies and Patents: A Study of the History and Future of the Patent Monopoly, Toronto, 1947 pp. 200-203).

1) who is doing research today?
2) who is supplying the financial means?
3) who is exploiting the results?

Ad 1) It is obviously still the inventor,, however his individual position has largely disappeared. First of all, inventive activity is increasingly being carried out by inventors employed by industry or, to a much smaller extent by special research organizations. Secondly, few inventions today can be exclusively attributed to the work of single individual. Modern organization and research has rendered the idea of a clear division between pure and applied science. Such a separation has always been used to distinguish between what is patentable and what is not. Whereas applied research is directed towards the solution of practical problems which would be of direct economic benefit to society and thus worthy of a monopoly grant, pure science was merely an extension of our general knowledge, the borderline between the two disciplines disappears. (Anderfelt, U. 1971, p. 31).

Whether patents play any significant role as incentives to inventive activity cannot be tested scientifically. That they do induce some inventors is very probable. The reason for doubting that the contemporary patent institution provides a major, and still more, a decisive incentive to research, however, do suggest that competitive forces within industries and public financial support provide more powerful research incentives.

Let us take an example of agricultural biotechnology, which is unique among natural sciences. In many cases the basic research of the 1970s has generally become, without substantive modification, the working tools of biotechnology in business today. A common pattern, in fact, has been for university scientists to build they careers and make their discoveries with public funds, and then either start their own companies, or join larger corporations. The question is what returns society can expect for its investment. Krimsky says, that the government should control the patents and processes that emerge from federally-founded research (Krimsky, S. 1983, pp. 51-70). Krimsky and Lappe argue that the public sector's large investment entitles it to play a mayor role in directing the uses to which biotechnology is applied (Lappe, M. 1984).[3]

A related concern is the impact of increased corporate funding on the research priorities of universities. Many labs formerly producing knowledge of use to all of in society-consumers, workers, farmers and business people, have become captives of a single corporation rather than the greater good of society (Lynn, F.M., Poteat, P., Palmer, B.L. 1988, p. 112, Kenney, M. 1986, pp. 245-246).

Ad 2) The formerly self-employed investor has to a large extent become an employee of industry and as a consequence

Ad 3) the individual, inventing and exploiting his invention by himself has largely been replaced in both capacities by corporations. In addition to the large portion of patents obtained by big corporation the self-supporting inventor has been replaced by the employee-inventor largely supported by government subsidies, and that the exploitation of inventions by large corporations, which by their size would be expected to dominate the smaller companies in the exploitation of the technology, is relatively greater than that of their smaller competitors due to uneven distribution of the government subsidies (see Anderfelt, U. 1971, p. 32).

Today, however, the competitive market structure has largely been replaced by conditions known as imperfect or monopolistic competition, and to the sole competitive weapon of earlier days - price - have been

[3] They question, for instance, the development of herbicide resistance in plants at a time when public policy goals are to decrease the use of these toxics, and contrast this to the difficulty of getting corporations to develop products such as malarial vaccins.

added several new devices such as trade marks and advertisings. The latter means of competition often overshadow that of pure price competition.

Patents may be barriers to market entry, or they may impede the flow of information and the mobility of factors of production. Evaluation of the patenting system is essentially a benefit - cost analysis. The benefits that flow to society must be weighed against the costs of creating statutory monopolies. Costs include monopoly rents and market inefficiencies which accompany them, the possibility that resources may be misallocated to activities which are unnecessary or duplicative, and externality or third-person effects which may be overlooked.

It should be admitted, that rather the rhythmic accumulation and discharge of small obligations creates routines that shape in turn expectation of co-operation. Differences of these expectations define social networks of different types; and only certain types of networks encourage innovative exchange. If wealth above a certain minimum is shared with one's kin for example, accumulation above that limit is discouraged. Economic co-operation results in innovation and growth, therefore only when networks are neither under nor over socialized (Sabel, Ch.F. M.I.T 7/21/93 p. 41).[4]

It also has to be said that a patent system is likely to be most useful in inducting innovation in those situations where imitation lags are short, innovative rivalry is not present, or where potential profits from innovations are small relative to the costs of innovation. Turning of the cost side of the patent process, one of the major costs to society is the ability of patent owners to extract monopoly rents. This is particularly true when the invention or innovation is conceptually new and there are no substitutes. In a perfectly competitive industry, there are few incentives to invest in research and development without a patent system.

III. Development of Variety Creation in Agriculture

1. Plant breeding, together with animal breeding and the development of production methods, was central to the transition of communities from a nomadic to a sedentary way of life. This transition occurred between the ninth and the seventh millennium BC, probably in a disconnected manner, in several places at the same time, including the Near and Middle East, Mexico, Central America and China (Gille, B. 1987, pp. 175-285). Sedentariness led to the development of present-day civilizations.

2. In very broad terms, plant breeding can be broken down into a number of overlapping technological and chronological stages.

   a) From the fifth millennium B.C until the second half of 19th century, *mass selection* was practised by the farmers themselves, with some attempts at specialization that led to the advent of the first "breeders", such as the Vilmorin family in the 18th century. This form of selection is not very effective,

[4] In the U.S. universities, with their decades-old division of academic labour, have not been readily-equipped to scientists, are less wedded to academic conventions,. Consequently, both the fundamental science of biotechnology with its revolutionary commercial applications and the interdisciplinary-based National Biotechnology Funds (NBFs) have collapsed the distinction between basic and applied research. The cross-traffic between universities and biotechnology companies is so constant and reciprocal that it is appropriate to consider them as part of the same technological community. Leading professors take their sabbaticals at NBFs, and both postdocs and senior scientists move back and forth between universities and NBFs. Universities scramble after one another to raid top biotechnology scientists when the fortunes of a company take a downward plunge. (Powell, W.W, Memo on Cooperative Competition in Biotechnology, American Academy of Arts and Sciences, July 30-31, 1993).

being strongly conditional by the environment of the plant. Mass selection was successful only because the original "varieties" of cultivated plants were in fact heterogeneous populations, characterized by internal genetic variability, which is indeed essential to all plant breeding processes.

b) As from the second half of the 19th century, three new concepts, namely *pedigree selection, pure lines* and *hybridization* accelerated plant improvement and bring about genuine, "variety creation". These methods gave rise to the development of varieties that were distinct, homogenous and stable, the three characteristics that form the basis of plant variety protection.

c) In the 1940s, *recurrent selection* began to develop. The method, known as the original population, involves making mixes and selections in successive cycles and thereby achieving cumulative selection.

d) For the past fifty years, in addition to the basic methods described above, breeders have been developing ways of modifying one or some of the characteristics of basic genetic structures of special interest. Three main methods are used, namely *mutation* (either genetic or chromosomal), *hack-crossing* and *genetic engineering,* which relies on various methods, either microbiological, physicochemical or physical for introducing recombinant DNA into a plant or animal. Genetic engineering considerably broadens the base of variability, since it allows a breeder to use genes not only of different species, but also from a different kingdom.

e) Significant advances in plant genetic *engineering* have occurred since 1985-1986. There is little doubt that the *momentum* in this field is accelerating and that advances in the development of more rapidly growing plants, particularly trees, the creation of salt and stress-tolerant plants and plants whose seed qualities are improved (improved oil properties, starch characteristic, protein quality) will be forthcoming within a decade. Other types of technologies are also receiving attention in the plant biotechnology areas, particularly novel diagnostic for plant diseases and plant viruses using nucleic acid hybridization techniques. Without doubt, plant breeding will be accelerated by advances in somatic cell culture (plant tissue culture) and genetics as well as by more sophisticated chemical/genetic regulation of male fertility.

The development of animals for agriculture are influenced by current developments in that field, *per se,* as well as by activities in the health care arena. The latter facilitates the translation of basic finding from animal models from myopathies and pathologies to an understanding of health problems in domesticated animals, and occasionally *vice-versa.* The development of transgenic animals, while moving rapidly at the experimental level, is already demonstrating the need for a greater understanding of the influence of gene position within a chromosome (context DNA) and the precise directed insertion of genes which will require a greater understanding of homologous recombination. (Biotechnology, OECD 1988, p. 20-27).

3. Until the turn of the century, plant breeding was primarily the business of farmers, some of whom had specialized in this field by the end of the 19th century. At the beginning of the 20th century, plant breeding was still carried on by some farmers, however on a diminishing scale, having been extensively taken over by public authorities. Since the Second World War, variety creation has been concentrated in public research agencies and private undertakings, which are beginning to predominate, at last with respect to species of major world-wide economic importance.

With the development of the creative breeding of new plant varieties and their introduction into production, it proved necessary to grant breeders legal protection that would at the same time permit such use of plant material as is necessary for multiplying these varieties. For a long time breeders were deprived of a proper protection of their creative work; a whole set of notions and legal structures had to be established to properly evaluate achievements in plant breeding. Patent law, because of its

requirements of novelty, non-triviality, repeatability and industrial usefulness, is not adequate for the protection of new plant varieties.

The separation of law establishing exclusive rights to new varieties of cultivative plants from patent law is fully justified by the necessity of distinguishing a biological from mechanical invention. The nature of a biological invention has several attributes completely incompatible with the requirements of patent law. New varieties are, for example, living organisms that, as such, cannot have the traits of repeatability or non-triviality. In addition, new varieties are investigated by experimentation involving the material used for the reproduction of the variety itself. Finally, in contrast to patent law, the novelty of a biological invention is novelty in a commercial sense.

All plant varieties, whatever their genus or species, must qualify for protection under the UPOV[5] system and under that system alone (prohibition of double protection). A new variety must be eligible for protection if it is distinct, homogenous and stable, irrespective of how it was bred.

As it was already said a basic policy behind any type of protection system for intellectual property law is the granting of an exclusive right to the subject matter so that it can be useful to the public when it is disclosed. The individual is rewarded for disclosing new information that can be put into the general pool of knowledge and used to advance technology and benefit mankind.

IV. Significance of Effective Law Protection of Research in Agriculture

Considering the economic and social significance of the improvements brought about social significance by variety creation and the scale of investment in research in this field, it is essential that the results of such research should be protected effectively.

This presupposes, first, a reasonable returns on the capital invested and, secondly, a system ensuring continued development of the underlying driving force constituted by selection based on the exploitation of genetic variability. As for biotechnological inventions, including both processes and products, they are becoming eligible for patent protection, although many uncertainties have yet to be cleared up as regards the subject matter and extent of the right granted.

The protection of intellectual property must take account of two essential considerations:

— the products to be protected, whether final or intermediate, are alive and self-reproducible. This must be taken into account in the laws governing their protection status;

— basic improvements in plant varieties and animal breds not only depend on the development of theories based on post experience and requiring, they also depend on earlier varieties breds, and this particular feature is quite unique in the history of technological development (Buanec, B.L., Geneva 1992).

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[5] The acronym UPOV is derived from the French name of organization, which is: "Union Internationale pour la Protection des (Detentions Vgtales". UPOV Convention on protection of new varieties of plants, signed in Paris in 1961, revised in Geneva in 1972, 1978 and 1991. 24 nations have joined UPOV: Australia, Belgium, Canada, Czech, Denmark, Finland, France, Germany, Hungary, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Poland, Slovakia, South Africa, Spain, Sweden, Switzerland, United Kingdom, United States of America. UPOV was created to develop and refine a system to recognize and protect the legal rights of plant breeders. It has played a major role in promoting a standarized level of intellectual property rights in plants in developed countries.

One could contemplate the introduction of a new, original set of rights in the light of these basic considerations and of current technological trends. However, it would certainly be preferable to be practical and proceed on the basic of the existing bodies of law, namely that deriving from the UPOV Convention for plant varieties, and patent law for biotechnological inventions.

Plant variety protection is often criticised 1) for contributing to the impoverishment of genetic variability world-wide[6] and 2) for impeding and /or preventing exchanges of the remaining variability.

As for as the first point is concerned, we have two different approaches to the issue.

Ad 1) a) the impoverishment of genetic variability clearly appears to be caused by variety creation itself, not by the legal protection of the results of variety creation. Indeed, the effectiveness of such creation has made vastly improved varieties available to farmers. The latter therefore tend to abandon earlier varieties, whether they are local populations or elaborate varieties already, in favour of the new areas. If a variety is highly efficient, it is naturally bound to spread rapidly over a large portion of any given growing area. Whether the variety was bred by a government laboratory or private enterprise, and whether or not it is protected, the outcome will be the same, and might even be precipitated in the case of an unprotected public variety

b) it is argued that rights to plant variety lead to a destruction of the Vavilov centers and an erosion of genetic material throughout the world though increased genetic uniformity; the multinational companies will be controlling over germ plasm. It is suggested that rights to plant variety encourage genetic uniformity, with the long-term possibility of total crop failures. (Bennett, J. 1979, 46-52, 84-86, Mooney, P. 1979)

Ad 2) As for the second point, the legal protection system should settle any controversy of this respect, because it provides both for effective protection of the results of variety creation and for free access to general genetic variability for the purposes of further improvement. The protection of biotechnological inventions, such as genes, which affords a much stronger monopoly than the protection of plant varieties as such, should not give rise to any difficulty, because it involves only a very small amount of variability, although such inventions may have required considerable investment.

The right granted must constitute an absolute monopoly of the reproduction or propagation of the variety for all commercial or industrial purposes, irrespective of the reproductive or other propagating methods used. The UPOV Convention (the text of 1991) clearly prohibits the practices permitted or tolerated in certain countries in the guise of the so-called fanner's privilege (the issue of whether farmers should have a right to save protected seed to plant in future years, which is an option under the 1978 provisions. The U.S. Senate held hearings to amend the Plant Variety Protection Act to make it illegal for U.S. farmers to sell saved seeds.).

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[6] In 1989 the FAO formed a Commission on Plant Genetic Resources (PGR), which adopted an "International Undertaking on Plant Genetic Resources" based on the concept of forms rights and national sovereignty over PGR. The U.S. later joined the Commission but has not signed the undertaking, See Bordwin H., The Legal and Political Implications of the International Undertaking on Plant Genetic Resources, 12 Ecology Law Quarterly 1053 (1985). The Convention on Biological Diversity (the Biodiversity Treaty) of June 5, 1992 was primarily refused to be signed by the U.S. The US's refusal was the result of opposition to what were perceived as vague and uncertain provisions on intellectual property rights relating to biotechnology and possible mandates to share technology with developing countries. However in 1993 the U.S. signed the Biodiversity Treaty, reflecting the different attitude of the Clinton-Gore administration on international environmental and biodiversity issues.

If the owner of the right so wishes, he must be allowed to exercise his right either in relation to harvested material or in relation to products directly obtained from the processing of such material.

A new variety derived from a protected variety is considered dependent on the protected parent variety if its genome as such is very similar to that of the parent variety. This is likely to occur where methods such as mutation, back-crossing or the introduction of recombinant DNA are used. The new variety is then said to be "essentially derived" from the parent variety. Its marketing must be subject to authorization the owner of the parent variety. If necessary, such approval must be coupled with financial license arrangements.

The title of protection for the new variety must be granted in accordance with the standard procedure based on the minimum distances described above, in other words on the basis of the expression of characteristics.[7]

It is only if and when the owner of the rights in the parent variety authorizes marketing to go ahead that the concept of economic benefit will be taken into account in setting the licensing fee for the dependent variety.

V. Protection of Biotechnological Inventions by Patent

Biotechnological inventions, whether processes or products[8] must be patentable, but to the exclusion of ail plant varieties. However, more problems are likely to arise in connection with products, that are by nature either living matter or biologically active. If these are to be protected effectively, a few modifications will have to be conceded in the principles of patent law, namely:

— the invention concept must be broadened, and a product dissociated from pre-existing, but hitherto non-dissociated material must be regarded as a patentable invention

— since the products in question are self-replicating, the marketing of such products must not exhaust the patentee's right in respect of acts relating to the propagation of the product

— if a patented product consisting of a piece of genetic information is introduced into a plant variety and if the information is expressed in the variety, the patented product must remain protected within the variety. Breeders' rights (based on the UPOV Convention) must be granted in respect of the new variety thus developed, provided that it is distinct, homogenous and stable, irrespective of the economic significance of the transferred genetic characteristic.

The new variety will be dependent on the protected genetic information and will only be marketable subject to the consent of the owner of the patent covering the genetic information in question. As with the dependent varieties examined above, the economic criterion should be taken into account when the amount of the licensing royalty is set. If the new variety is used in a breeding program involving the random recombination of characteristics, the "offspring" of the breeding program will also be dependent on the patent

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[7] Work will be necessary for specialists to set the threshold of genetic similarity beyond which a variety should be declared dependent.

[8] It is not always easy to distinguish processes from products in the field of biotechnological inventions, especially in the case of modified micro-organisms used in the production of a specific protein for example.

for the original genetic information if the latter continues to be expressed, and this applies until the expiry of the patent. Where description difficulties prevent persons skilled in the art from carrying out the invention, the latter can still be protected after it has been deposited in a recognized culture collection. The sample should be made available to third parties only if a patent has been granted. However, it must be made available to recognized experts in the event of opposition proceedings (the same applies where the invention is a production process or part of such a process, as a micro-organism or plant cell would be).

Relations between the UPOV system and the patent system are governed satisfactorily by the principle of the interdependence of plant varieties and biotechnological inventions. However, plant varieties and micro-organisms must be defined precisely in order to avoid any ambiguity. (The European Patent Convention of 1973 does not allow for the patenting of new varieties of animals and plants and new technical methods, however this is not the only solution. For example the U.S. Patent and Trademark Office has already granted a patent to the inventor of a genetically modified mouse to be used in cancer research. This act may stimulate other countries to re-examine this prohibition in Europe).

VI. Conclusions

The history of the patent institution convincingly demonstrates that the fundamental reason for its introduction was the expected benefits to the national economy from rewarding those who invented and those who introduced foreign-made inventions into the national economy.

Also originally, an invention to be patented had to be developed to the state at which it could be practically exploited. Though such cases may still exist, in practice, patented inventions are often far from the commercial stage, and additional time and finances are needed to complete and lunch the product on the market (the immensely more complicated technology of today).

Major part of the support provided by the patent system has shifted from the inventor to the invention, and that its incentive is more important for the innovative than for the inventive phase.

Modern innovative work in agriculture is dependent on an appropriate legal framework. Especially today law has come to play a dominant role in the emergence of a new technology (biotechnology). Among various legal issues those related to patenting or quasi-patenting (breeders' rights) have remained a cause of concern for everyone who deals with innovative work in agriculture.

It has been necessary to change or to reinterpret basic legal practices; this is not easily done. Thus, while the need to reassure a worried public has led policy makers to emphasize the traditions of new technologies used by inventors (particularly the genetic engineering), the need to improve patent protection has also led to greater emphasis on scientific and technical innovation. These two approaches are not necessarily contradictory as they address different issues related to biotechnology.

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