SEMINAR ON THE NATURE OF AND RATIONALE FOR THE PROTECTION OF PLANT VARIETIES UNDER THE UPOV CONVENTION





UPOV


Organized by
the International Union for the Protection of New Varieties of Plants
in cooperation with
the Government of the Republic of Hungary

Budapest, Hungary, September 19 to 21, 1990

Cover: Views from Budapest (from left to right):

(Top): "The Little Clown" on the Danube Corso; inside the Old Market Hall; the Fishermen's Bastion.

(Bottom): the Hilton Hotel with the Fishermen's Bastion reflected in its windows; the Liberty Bridge.

(Photos: Pia Huber, UPOV)

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GENEVA

1991

FOREWORD

The International Union for the Protection of New Varieties of Plants (UPOV), in cooperation with the Government of Hungary, organized a Regional Seminar on the Nature of and Rationale for the Protection of Plant Varieties under the UPOV Convention, which was held in Budapest from September 19 to 21, 1990.

The Seminar considered the following: the history of the UPOV Convention and the rationale for plant breeders' rights; the basic provisions of the UPOV Convention, and their possible revision; the interface between plant breeders' rights and other forms of intellectual property protection, notably patents for inventions; the impact of plant breeders' rights on the economy, seen from the viewpoints of a Government and of the plant variety and seeds industry, and also in terms of technology transfer.

The Seminar afforded participants, especially government officials who would be involved in the formulation and implementation of policies concerning plant breeders' rights, an opportunity to understand better the wide-ranging benefits of a plant breeders' rights system based on the UPOV Convention.

The Seminar also provided the opportunity to visit the impressive installations of the Agricultural Research Institute of the Hungarian Academy of Sciences at Martonvásár and to see at least one facet of Hungary's long cultural history. The main building of the Institute is a manor house of the Brunszvik family which also contains a Beethoven Museum, a token of the great composer's friendship with the Brunszviks and his frequent visits to Martonvásár.

The Seminar was attended by some 50 participants, most of whom came from the central and eastern parts of Europe. They represented a range of governmental, scientific, industrial and commercial interests.

This publication contains the texts of the addresses and presentations given by the speakers and other relevant information.

Arpad Bogsch
Secretary-General
International Union for the Protection
of New Varieties of Plants

Geneva, June 1991

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THIRD SESSION: THE IMPACT OF PLANT BREEDERS' RIGHTS ON THE PLANT VARIETIES AND SEEDS INDUSTRY AND ON THE TRANSFER OF TECHNOLOGY

Chairman: Barry Greengrass, Vice Secretary-General, UPOV

OPENING ADDRESS

by

Arpad Bogsch, Secretary-General of UPOV

Mr. Under Secretary, Dr. Endre Mándy;
Mr. President of the Council of UPOV, Mr. Wilhelmus F.S. Duffhues;
Mr. President of the National Office of Inventions, Dr. István Iványi;
Ladies and Gentlemen,

It falls to me as Secretary-General of UPOV to open this UPOV Seminar on the Nature of and Rationale for the Protection of Plant Varieties under the UPOV Convention which is jointly organized by UPOV and the Hungarian Government.

The holding of such a seminar jointly with a UPOV member State is an innovation for UPOV. UPOV has under consideration the holding of a series of such seminars which will be intended primarily for interested circles in specific regions or groups of countries where interest in UPOV is known to exist. This is the first such seminar to be held. The region which was considered to be the primary focus of this Seminar comprised the countries of Central and Eastern Europe.

The initial discussions concerning this Seminar took place in 1988 and early in 1989. The remarkable political developments that have occurred in this region in the intervening period were not, of course, anticipated in these discussions. However, a likely consequence of the many changes which are taking place would seem to be an increased interest in incentives for investment in innovation. The UPOV system of plant variety protection provides an incentive for investment in plant breeding and is the system of choice for the protection of plant varieties in most countries which provide such protection. The holding of this Seminar in this place at this time would seem to be particularly appropriate.

Poland and Hungary are current members of UPOV and the Czech and Slovak Federative Republic has recently enacted a plant breeders' rights law. We hope that this Seminar will assist the remaining countries of the region to assess the relevance of plant variety protection to their future development.

There are today 19 member States of UPOV. However, Canada as well as the Czech and Slovak Federative Republic have recently enacted a breeders' rights law which conforms with the UPOV Convention and we look forward to their accession in the coming months. A number of other States have proposals for plant breeders' rights legislations at an advanced stage. UPOV can reasonably anticipate a membership of between 25 and 30 States by the mid-1990's.

The worldwide interest in the protection of innovations in the field of plants is reflected in current proposals to revise the UPOV Convention and in the holding of this seminar. Many critical policy decisions must be made by legislators in the years ahead and the Council of UPOV is concerned to ensure that knowledge concerning UPOV and the rationale for its system of plant variety protection are widely available.

The benefits of enhanced plant breeding activity, which we will learn about and discuss in this seminar, are considerable. I have pleasure in opening the Seminar and calling upon Dr. Endre Mándy, Under Secretary of State of the Ministry of Agriculture of the Republic of Hungary, to deliver an address of welcome.

WELCOME ADDRESS

by

Endre Mándy, Under Secretary of State of the Ministry of Agriculture and Food of the Republic of Hungary †

It is a great honor for my Government to have the opportunity to act as hosts to this Seminar.

The thirty years that have elapsed since the foundation of the UPOV Convention have been devoted to extensive and thorough work. When referring to the activities that are conducted under the scope of the Convention, I could not even attempt to give a full description of them, but only cite some examples. May I mention as the first one the unification of the concept of plant variety, on the basis of the conditions that have to be satisfied if a variety is to be protected. The detailed documents which serve as the basis for the examination of plant varieties for distinctness, homogeneity and stability are another example. The cooperation established among the member States in the examination of plant varieties has reduced the costs of the examination system and at the same time harmonized and further developed the procedures in this field.

We, in Hungary, feel that we have to express our heartfelt thanks for that kind of cooperation; if it has provided considerable assistance to our plant breeders and enabled Hungary to accede to the UPOV Convention, our membership of the community created by that Convention has also promoted in some ways the improvement of the national legislation. For, in this particular area, the Hungarian legal system was lagging behind the European standards and systems and could catch up through accession to the UPOV Convention.

But during this thirty-year period revolutionary changes have also occurred within the UPOV scope of activities, and it is quite understandable that UPOV, as a living organization, responds to new events. The idea has been raised, for example, to broaden the scope of the protection system, now limited to plants, to include animals as well; to extend the rights granted to the breeder to the use of cells and cell components; and to provide protection for biotechnological processes.

This particular Seminar will undoubtedly contribute to the solution of these new problems. May I, on behalf of the Ministry of Agriculture of the Hungarian Republic, wish you every success, ladies and gentlemen, in your work at this Seminar. I would also like to wish you a pleasant stay in Hungary and express again our heartfelt thanks for your accepting our invitation.

KEYNOTE ADDRESS

by

W.F.S. Duffhues, President of the Council of UPOV

I am very glad to be here in Budapest on the occasion of this Seminar. First of all, because I was here during my holiday and saw how beautiful Hungary and its capital are. I have experienced at first hand the kindness of the Hungarian people. Of course, the Hungarian language is very difficult for us, even to the extent that, when Hungarians are chatting together, I do not understand a single word. I have seen a relatively large scale agriculture with, so far as I have observed, good crops which promised high yields. I have seen horticultural products, fruits and vegetables, in the market stalls along the roads. My impressions have been favorable, but with my knowledge of Dutch horticulture, I feel that further progress is possible. I know that Dutch plant breeding firms are active in your market and look forward to seeing the results of your joint efforts.

However, the most important current issue must be the economic transformation of your country from a planned economy to a market economy, with more and more private enterprises. Such a transformation is easy to talk of, but I know that it is not so easy to bring about in practice.

But beside all this, there is a particular reason to be glad to be here and that is because you have organized a seminar here in Budapest whose goal is to make the role of protection in the field of plant breeding clearer and I have the honor, as we say, to bear the brunt of getting the formal part of our proceedings underway. I will approach our topic with a short review of the importance of agriculture in the world and progress to the role of plant breeding in both its classic and modern biotechnological dimensions.

Four Categories

In today's world we see extremely great differences in agricultural development. We know, that in the developed countries agriculture nearly always decreases in relative importance economically, while at the same time the food supply position improves. In my view one can distinguish four states of agricultural development which blend more or less smoothly into each other depending on the stage of development of the country.

First, we see countries of the third world, where most of the people work in agriculture. They often do that on a very small scale, using antiquated methods and poor equipment deployed in adverse circumstances. In these countries famine is often experienced and if things go wrong many people die because of a lack of food.

Secondly, there is the category of countries that are developing faster and faster. In these countries more and more people are employed outside agriculture. The agricultural holdings become bigger, they become better equipped and produce not only for themselves, but also for the market. In these countries there is often enough food, but sometimes it is difficult to distribute it in such a way that everybody, including the very poor part of the population, has enough food.

The third category I see is that of countries that have access to all the latest developments. But they have not so far succeeded in producing enough food for their own people on a regular basis. The state-guided planned economy countries, where holdings are very big, well equipped and specialized, fall into this category. But in my view bureaucracy and mismanagement (perhaps because of a lack of individual responsibility) causes insufficient yields year after year. In these countries everybody has enough food to survive because of the care of the government, that every citizen will be satisfied on this point, but quality, choice and ready availability leave much to be desired.

The fourth category of country is that of countries in the developed world with, in principle, market-oriented production. In these countries there is plenty of food, relatively cheaply produced, with modern equipment on very specialized holdings. The main tendency is to over-produce and we see that measures have to be taken to decrease production.

Politics

I think, from this brief overview of agriculture in the world, that it is clear that it is possible to produce sufficient food for the world's population of five billion people. At the same time it has to be stated that on the one hand one billion people are hungry or have less food than necessary, while on the other hand in the GATT negotiations on agriculture an agreement on reducing surplus due to subsidy will only be reached with great difficulty. The cause of the difficulty is the argument between the two biggest (over) producers of the world, the EEC and the United States of America, an argument based entirely on the extent to which it is acceptable to subsidize agriculture in your own country, so that the farmers have an income, when the resulting surplus products have to be sold on a low-priced world market. From a purely economic point of view it has to be said, that for certain products, for example milk and wheat, the real costs of production are too high in relation to world market prices. But without subsidies farmers would stop production of those particular crops or stop farming altogether. Governments do not want either of these possibilities to arise since: first, they are concerned about the food supply and the possibility of dependence in this vital sector on other countries, and secondly, they are concerned to maintain the countryside. So we must recognize that agriculture is not based on purely economic considerations, even in the market-oriented producing system of the western world.

Here, as everywhere else in the world, agricultural production is subject to political decisions. In all agricultural production systems, whether to avoid dependency or because of a philosophy of state guidance or in order to prevent starvation or shortages, political decisions influence the agricultural production and food situations.

Other Factors

Accordingly we have a situation with in the one part of the world, abundance of all kinds of high quality, fresh products and occasionally waste arising from excess supply, while in the other part we find shortages even of the most elementary foodstuffs.

It would be preferable to have a better balance, at least so as to ensure that there is sufficient food for the healthy nutrition of all people in the world. Of course there is a limit to the possibilities of producing food and as a result there is a limit to the number of people our world can support. But for the five billion human beings of the present day there is enough productive capacity. But even if the necessary food is produced and if political circumstances are favorable, the means to get the food to the right place at the right time are needed in addition.

Facilities for storage and transport are required, operating in such a way that production, storage, transport and distribution to the consumer takes place as one coordinated process. If one link in this chain is missing all the preceding labor is for nothing. So we see there is far more involved than the factors involved in production on the farm; economics, politics, organization, transport, logistics, roads, markets, storage possibilities and technology are all indispensable.

Besides all this, there is the point, just mentioned before, that we need the healthy nutrition of mankind; we need healthy food.

One of the main threats to food supply, aside from climatological circumstances, is the fact that in producing agricultural products, whether of a plant or animal nature, we experience epidemics of disease and plagues of pests. Such diseases and plagues can be so heavy that they cause crop or production failures. The more intensive the growing or production, the greater become the chances of diseases. As soon as there is a disease break-out, it effects the whole crop very quickly. This is particularly the case with intensive production, but we know from history there were many epidemics and plagues in earlier times as well. I can demonstrate this with a few examples: the potato eelworm disease in the eighteen-fifties, potato blight at the beginning of this century, the colorado beetle or plagues of locusts, swine fever in the pig industries or foot and mouth disease of cattle, all breaking out at one time or another. At the present time, to prevent disasters or to cure their results, we use pesticides or medicines and we need them very much, but we are very careful now in permitting their use. It has become evident over the last ten years, that many of the pesticides, insecticides or medicines in current use are more dangerous than we thought. Development in modern technology has taught us a lot about residues in plants, fruit or seed which are used for consumption and their effects upon the bodies of human beings. We have also learned a lot concerning residues in the soils and in this last case we are also concerned by the use of fertilizers and manure necessary to get a good yield of high quality. In this case also there is the threat of undesirable residues in the soil, with the possibility of carry over to the next crop. Alongside all this, in forcing plants, we sometimes make them weaker, so that they are more susceptible to infections, and then we need even more pesticides and so you see the circle goes round and round!

As an example of this I may take my own country, The Netherlands. We are very proud to be the second exporter of agricultural products in the world after the United States of America. But to reach this position we produce very intensively, in animal husbandry as well as in arable crops, horticulture, floriculture and arboriculture. We produce to high quality standards, have very good business methods, fast transport and good storage facilities.

But we have a small country and to secure our production levels, we need imports of fodder for the animals, we use natural gas in glasshouses, we use a lot of pesticides and fertilizers, we produce too much animal manure, we use too much water and we produce too much residual plant waste at the end of the production process.

So whilst we produce good products, we threaten our environmental conditions at the same time and, even, in the long term our very capacity to produce!

In very intensive agriculture there is a threat to the environment arising from agriculture itself by the exaggerated use of pesticide and fertilizers. In tropical areas the environment is in danger because of deforestation to enlarge the agricultural area. This is an environmental threat of a completely different order. Millions of hectares of tropical rainforest are disappearing. The trees are felled because of the potential for food production and of the erroneous idea, that this kind of land is so fertile that it can produce everything, without inputs of fertilizers, pesticides or water. This is a big misunderstanding because the rainforests are part of a fully self-regulating system. When one disturbs this, it will be destroyed within a few years. We see indeed, that often these soils are abandoned after a few years because of bad yields. Sometimes they remain in very extensive use, sometimes they simply become deserts.

Deforestation is a threat for the world's environment, again the circumstances are understandable, but it nonetheless constitutes a threat for the future.

Plant Breeding

Although I am aware of the fact that I have only made a few generalisations on the huge, complex field of agriculture, I have to step over now to plant breeding and its importance as a source of solutions to the stated problems and difficulties.

From ancient times it is known that some qualities were inherited by children from parents. In the nineteenth century, it was Mendel who discovered the basic principles of inheritance and after him additions to scientific knowledge in this field came faster and faster.

The concepts of inheritance became ever clearer and the possibilities for selective plant breeding ever greater.

Competition to offer improved plants and seeds to growers increased and the reproducible nature of seeds and plants created special difficulties for their originators. Besides that, the costs of plant breeding became higher and higher so it became necessary to protect in one way or the other way the end products of breeding in order to ensure that the breeding would continue.

But that, of course, was only possible, if the end user, the farmer mostly, was willing to pay for the right to use the breeder's creation, always on the assumption that the amount to be paid was reasonable.

I think it is clear that it was a job for the public authorities to bring the different interests together. Laws existed in a number of countries but unfortunately there were differences between these laws and differences in interpretation and which constituted a threat, particularly to the growing international commercial movement of seeds and plants. The International Union for the Protection of New Varieties of Plants (UPOV) was created as a result of the International Convention for the Protection of New Varieties of Plants of 1961. In the UPOV Forum there is the opportunity to discuss the legal principles and technical guidelines, necessary for the effective protection of varieties, so as to ensure the continuity of plant breeding in the future with the full deployment of technological resources that science gives to the breeder, including all the possibilities of biotechnology.

There are currently discussions about the use of genetic materials with special qualities from geographical areas of the world that one would like to have in the varieties used in agriculture or horticulture. Often these areas are situated in underdeveloped countries, and sometimes it is said that there should be a form of protection for these genetic materials as well. Whatever view you take on this particular question, it is nonetheless necessary for the future development of agriculture that there be free availability of important genotypes for further breeding. In order to secure this, we may have to think more about the difficulties of the lesser developed and developing countries. Perhaps we can help them to set up breeding activities. Of course I know, there is a lot going on in this field in the developing world, but I will put here the question: "Is this existing activity enough to secure a faster and more independent development, or could these activities be supplemented by activities based upon the incentive system of breeders' rights?"

Besides that, I think that it is absolutely necessary to make big efforts to overcome diseases and plagues in an environmentally friendly way, without the damaging use of pesticides, as far as possible of course. Besides that I think that there are more possibilities for using plants or varieties of plants that can replace the use of energy from fossil fuels, so that carbon dioxide emissions and their associated possible climate problems can be reduced. I think that plant breeding can contribute to solving the problems of hunger, the problems with the environment and the problems of unacceptable climatic changes.

From this viewpoint the protection of plant varieties will be of increased importance. A worldwide agreement on how best to protect varieties and associated technology will be more and more important. Such an agreement will only be attainable if governmental bodies and national and international organizations understand each other. And in the triangle made up of government, industry and science, it is absolutely necessary that the free development of science is guaranteed and that its discoveries are soon available for exploitation by an industry that has been provided with a reasonable level of industrial property protection by government. To secure the objectives of a worldwide agreement, the industrial and other circles must formulate ever more precisely what they desire from science and from governmental bodies.

Ladies and gentlemen, these following days may at least bring us a step further in understanding each other.

Thank you for listening.

F I R S T S E S S I O N

HISTORY OF THE UPOV CONVENTION,

RATIONALE FOR PLANT BREEDERS' RIGHTS AND

BASIC FEATURES OF THE PLANT BREEDERS' RIGHTS SYSTEM

UNDER THE UPOV CONVENTION

Chairman: Bálint Szalóczy, Deputy Director-General, Institute for Agricultural Qualifications, Hungary

THE HISTORY OF THE UPOV CONVENTION AND THE RATIONALE FOR PLANT BREEDERS' RIGHTS

by

André Heitz, Senior Counsellor, UPOV

The Ancient Art of Plant Breeding - The First Scientific Insights

"New plant varieties are the most significant element of technological progress in modern agriculture. Increasing importance is consequently attached to their legal protection." These were the introductory words of the first-ever general study published in the UPOV Newsletter.[1] It related to "Some Aspects of the Legal Protection of Plant Varieties in the Soviet Union" and was by A.A. Komissarov, the then President of the State Committee for Inventions and Discoveries.

Man has probably become a plant breeder with the very beginnings of agriculture. For a number of crops, the earliest archaeological remains show an evolution in relation to the wild ancestors that is inconsistent with a short period of domestication.[2] He has used--and maintained--varieties for millennia. In the case of vegetatively propagated species, varieties have been mentioned by Roman authors.[3] Yet it was only recently, in fact in this century, that the empirical notion of variety received a scientific basis. In the case of sexually reproduced species, the prerequisite was an understanding of the mating systems and of the laws of heredity. The latter were discovered by the Moravian Johann (or Gregor) Mendel, but the importance of his findings, published in 1865, was not captured by the scientific community of his time. They were to be 'rediscovered' in 1900 by K.E. Correns, E. von Tschermak and H. de Vries. The concept of pure line, to name but one type of variety, was then elucidated by W.L. Johannsen, a Danish biologist, in two famous publications of 1903 and 1926.[4] By that time, pure line selection was already a well-established breeding method. Mendel indeed owed his success, among other things, to the use of pure lines.

The Papal States: A Possible Precursor

As far as the protection of plant varieties is concerned, tradition attributes to the Papal States the role of forerunner. However, the Edict of September 3, 1833, concerning declarations of ownership of new inventions and discoveries in the field of art (technology) and agriculture was general in nature and has never been implemented.[5] It was to remain unique in its kind for almost a century.

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1 No. 6 (August 1976), pp. 9-15.

2 A general historical overview can be found in R.W. Allard, Principles of Plant Breeding, John Wiley & Sons, 1960, pp. 7 et seq.

3 For instance the lady-apple (appiana mala) by Plinius the Naturalist or the muscat grape (apiana uva), again by Plinius and by Columella.

4 Ueber Erblichkeit in Populationen und reinen Linien, Gustaf Fischer, Jena, 1903; Elemente der exakten Erblichkeitslehre, Gustaf Fischer, Jena, 1926.

5 B. Laclavière, La protection des droits des obtenteurs sur les nouvelles espèces ou variétés de plantes et la Convention de Paris du 2 décembre 1961 pour la protection des obtentions végétales, Bulletin technique d'information des ingénieurs des services agricoles, No. 168 (April 1962).

For, to our knowledge, the question of rights in respect of plant varieties has not been addressed until the first requests were voiced by industry: around the turn of the century in the United States of America and, in Europe, in 1904 and 1911 at the Congrès pomologique de France (French Fruit Growing Congress).[6] It was also in 1911 that the question of the relevance of a sui generis form of protection was raised for the first time. But, for various reasons, the attention of the official circles could not be captured. In particular, it seems that the laudable intellectual effort of Mr. Martinet, the Director of the Swiss Federal Seed Testing Station of Mont-Calme near Lausanne, and Mr. Louis Martinet, a horticulturist of Lausanne, have not been followed up. The seeds thus sown were to bear fruit only some decades later.

The United States Plant Patent Act

The efforts in the United States of America were pursued much more vigorously. They led to the tabling, in 1906, of "A Bill to amend the laws of the United States relating to patents in the interest of the originators of horticultural products."[7] Further Bills were introduced in Congress in 1907, 1908 and 1910, but also without success.

The attempts to place the plant breeder on a similar footing as the inventor or author finally succeeded in 1930 with the enactment of the Townsend-Purnell Act, or 'Plant Patent Act,' now consolidated into Title 35 of the U.S. Code (Patents) as Sections 161 to 164.[8] Although it is a part of the Patents Code, the Act, as consolidated in 1952 and amended in 1954, is a sui generis system which anticipates in many respects the UPOV Convention. It is therefore appropriate to consider its interesting features:

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6 Anonymous, De la protection des nouveautés fruitières et végétales, La Propriété industrielle (PI), 1911, pp. 191-192.

7 R.G. Adler, Können Patente und Pflanzenzüchterrechte nebeneinander bestehen?, Gewerblicher Rechtsschutz und Urheberrecht, Internationaler Teil (GRUR Int.), 1988, pp. 11-26.

8 The currently applicable text is as follows:

"Section 161. Patents for Plants

"Whoever invents or discovers and asexually reproduces any distinct and new variety of plant, including cultivated sports, mutants, hybrids, and newly found seedlings, other than a tuber propagated plant or a plant found in an uncultivated state, may obtain a patent therefor, subject to the conditions and requirements of title. (Amended September 3, 1954, 68 Stat. 1190.)

"The provisions of this title relating to patents for inventions shall apply to patents for plants, except as otherwise provided.

"Section 162. Description, claim

"No plant patent shall be declared invalid for noncompliance with section 122 of this title if the description is as complete as is reasonably possible.

[Cont'd]

(i) The Act was restricted to asexually reproduced varieties on account of the belief that sexually reproduced varieties would not remain true to type, i.e. true to their description, i.e. stable.[9]

(ii) It excluded tuber-propagated plants--in practice potato and Jerusalem artichoke--from patentability, officially, because of the enforcement problems caused by the identity between the propagating material and the material sold as food[10] and, unofficially, because of the then strongly-felt (and currently still widespread) fear of 'monopolies' in the field of basic foodstuffs (the reluctance to such monopolies was also material in the exclusion of sexually reproduced varieties from patentability).[11]

[Footnote 8, cont'd]

"The claim in the specification shall be in formal terms to the plant shown and described.

"Section 163. Grant

"In the case of a plant patent the grant shall be of the right to exclude others from asexually reproducing the plant or selling or using the plant so reproduced.

"Section 164. Assistance of Department of Agriculture

"The President may by Executive order direct the Secretary of Agriculture, in accordance with the requests of the Commissioner, for the purpose of carrying into effect the provisions of this title with respect to plants (1) to furnish available information of the Department of Agriculture, (2) to conduct through the appropriate bureau or division of the Department research upon special problems, or (3) to detail to the Commissioner officers and employees of the Department."

9 S.B. Williams, Jr., Intellectual Property Aspects of Plant Variety Genetic Engineering: View of an American Lawyer, in: Genetic Engineering and Plant Breeding, UPOV, 1983, pp. 23-46.

10 Senate Report accompanying S. 4025, Report No. 315, 71st Congress, 2nd Session:

"The bill excepts from the right to a patent the invention or discovery of a distinct and new variety of a tuber-propagated plant. The term 'tuber' is used in its narrow horticultural sense as meaning a short, thickened portion of an underground branch. It does not cover, for instance, bulbs, corms, stolons and rhizomes. Substantially, the only plants covered by the term "tuber-propagated" would be the Irish potato and the Jerusalem artichoke. This exception is made because this group alone, among asexually reproduced plants, is propagated by the same part of the plant that is sold as food."

11 E.M. Thomas (co-author), Outline of the History of the United States Patent Office, Journal of the Patent Office Society (JPOS), July 1936, No. 7.

(iii) It included discoveries into the scope of the Act--a major innovation in view of the 'product of nature theory' which has been held against the patentability of varieties for decades[12] and is still playing a role today.[13] However, in line with the original intent of the lawmaker, "a wild variety, a chance find of the plant explorer"[14] was excluded through the reference to "a plant found in an uncultivated state."

(iv) It required from the applicant that he asexually reproduce the new variety to demonstrate the permanence of the characteristics of the plant claimed (and thus the homogeneity and stability of the variety). This is of perhaps anecdotical interest in the context of the current debate on the definition of 'variety' to be inserted in a new Act of the Convention and on the question whether a variety may be 'constituted' or merely 'represented' by a single plant.

(v) It set out the requirement of distinctness, without further precision, but the Congressional documents provided some guidance on this.[15] In particular, there was a requirement for a "clear distinction," without any relation to "inferiority" or "superiority" since "experience has shown the absurdity of many views held as to the value of new varieties at the time of their creation," but with a reference to the "practice of botanists."

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12 The objection was still raised in 1961 in La Propriété industrielle / Industrial Property (IP) by L.E. Le Grand (L'invention en biologie - Les nouveautés végétales (ou animales) sont-elles brevetables?, pp. 30-36) some months before the adoption of the UPOV Convention.

13 Particularly in the field of microorganisms, where practitioners propose that a distinction be made between "isolation" and "discovery," also to satisfy the requirement of non-obviousness or inventive steps.

14 Quoted by J. Rossman, The Preparation and Prosecution of Plant Patent Applications, JPOS, 1935, pp. 632-644.

15 Rossman, op. cit., quoted the following from the Senate Committee report No. 315, 71st Congress, 2nd Session accompanying S 4015:

> "In order for the new variety to be distinct it must have characteristics clearly distinguishable from those of existing varieties, and it is immaterial whether in the judgment of those of the Patent Office the new characteristics are inferior or superior to those of existing varieties. Experience has shown the absurdity of many views held as to the value of new varieties at the time of their creation.
>
> "...In order for a variety of plant to be distinct it is not necessary that it be a variety of a new species. A variety of plant may be patented if it is a new and distinct variety either of an existing or of a new species, or if it is an entirely new species of plant.
>
> "The characteristics that may distinguish a new variety would include among others, those of habit; immunity from disease; resistance to cold, drought, heat, wind, or soil conditions; color of

[Cont'd]

(vi) The novelty requirement is the same as for "utility patents,"[16] and is assessed essentially against prior knowledge, use, patenting or description.

(vii) The applicability of the non-obviousness requirement enshrined in Section 103 is uncertain.[17] Whereas the Supreme Court elaborated an interpretation requiring a value judgment in Yoder Bros. v. California-Florida Plant Corp.,[18] the practical operation of the system results rather in a

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[Footnote 15, cont'd]

flower, leaf, fruit, or stems; flavor; productivity, including everbearing qualities in case of fruits; storage qualities; perfume; form; and ease of asexual reproduction. Within any one of the above or other classes of characteristics the differences which suffice to make the variety a distinct variety, will necessarily be differences of degree. While the degree of difference sufficient for patentability will undoubtedly be a difficult administrative question in some instances, the situation does not present greater difficulties than many that arise in the case of industrial patents.

"In specifying the differences in characteristics the Patent Office will undoubtedly follow the practice among botanists in making use of verbal descriptions and photographic and other reproductions, taking some known plants as a basis of comparison. Modern methods of identification, together with such amplification thereof as may reasonably be expected, will render it possible and practicable to describe clearly and precisely the characteristics of a particular variety. When this can not be done by an applicant for a patent, the variety is not clearly distinguishable as a distinct variety, and no patent would issue."

16 i.e. as defined in Section 102.

17 Section 103 reads as follows:

"Section 103. Conditions for patentability; non-obvious subject matter

"A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

18 193 USPQ 264 (5th CA-1976):

"...If the plant is a source of food, the ultimate question might be its nutritive content or its prolificacy. A medicinal plant might be judged by its increased or changed therapeutic value. Similarly, an ornamental plant would be judged by its increased beauty and desirability in relation to the other plants of its type, its usefulness in the industry, and how much of an improvement it represents over prior ornamental plants, taking all of its characteristics together."

requirement of 'meaningful' distinctness as provided by Article 6(1)(a) of the UPOV Convention on the basis of the notion of "important characteristics."[19]

(viii) It alleviated the requirement that the patent disclosure contain sufficient information and direction to allow a person of ordinary skill and knowledge to put the invention into practice and work it. It thereby overcame the problem of reproducibility of the breeding process, which is still of current interest.[20]

(ix) It provided for a limitation to a single claim for the "plant" (or variety) and thus excluded vertical extensions (e.g. to the fruit or flower) and horizontal extensions (to similar varieties).

(x) It defined a limited effect of the right, which related to the asexual reproduction of the "plant" and the sale and use thereof. Royalty collection is to take place at the reproduction level according to the Yoder decision. A major element of uncertainty derives from the phrase "reproducing the plant." It is suggested in Yoder that infringement of a plant patent presupposes the use of material from the patentee or derived therefrom.[21] The Pan-American Plant Co. v. Matsui decision[22] affirmed the contrary one year later in a footnote recalling the fate of the move by the defendant for a summary judgment.[23]

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19 S.D. Schlosser, in: Records of the Geneva Diplomatic Conference on the Revision of the International Convention for the Protection of New Varieties of Plants, 1978 (Records of 1978), UPOV, 1981, at p. 183.

20 For instance in Canada as shown by the Supreme Court decision of June 22, 1989, in Pioneer Hi-Bred v. Commissioner of Patents.

21 "Plant Variety Protection statute, 7 U.S.C. 2321-2583, applies only to sexually reproducing plants; asexual reproduction is only way that breeder can be sure he reproduced plant identical in every respect to parent so that it is possible that plant parent infringement would occur only if stock obtained from parent plant is used, given unlikelihood that any other plant could actually infringe; accused infringer that proved it developed accused plant independently would not be liable in damages or subject to injunction for infringement, but whether it would be entitled to patent is problematic; asexual reproduction is heart of plant patent system; key to 'invention' of new plant is discovery of new traits plus foresight and appreciation to take step of asexual reproduction."

22 198 USPQ 462 (D.C. N. Calif. 1977)

23 "...Defendant contended that the Plant Patent Act prohibits only the sale of plants grown from plant material cloned directly from the patented plant. The Court concluded that defendant's interpretation of the Plant Patent Act is incorrect, and that the Act bars the asexual reproduction and sale of any plant which is the same variety (i.e., has the same essential characteristics) as the patented plant, whether or not the infringing plant was originally cloned

[Cont'd]

The American lawyers were conscious of the fact that the Plant Patent Act was experimental[24] or embryonic.[25] Experience shows, however, that once the basic questions left open by the conciseness of the Act had been settled during the formative period, it did very well indeed as demonstrated by the success of one of the branches of industry which has extensively used the plant patent system, the American fruit tree breeders. But it could not serve as a model to be readily copied by other countries (only Cuba in 1937, South Africa in 1952 and the Republic of Korea in 1973 introduced plant patents, probably in an effort to align their overall patent system to the American one). Rossman (op. cit.) regretted in 1935 that "the provisions for plant patents were hastily injected into the basic patent laws without fully providing for all contingencies which may arise"; he expressed the view that "it would be much more satisfactory to have a separate plant law as in the case of design patents."

European Attempts to Introduce an Integrated Variety and Seeds System

Although the aversion to patents in the field of food--based on fear that "protection might increase the price of food [...] necessary for the greater masses of the population, and that all might suffer from the privilege granted to a single person"[26]--was as strong in Europe as in the United States of America, the efforts to secure a source of revenue for breeders were particularly directed in the initial phase at agricultural crops this side of the Atlantic. They were deployed in two directions: organization and moralization of the seed trade, and patenting.

In the 1920's and 30's various States introduced (or tried to introduce) the embryos of the current seed certification and national lists of varieties (catalogs) systems,[27] in some cases on the basis of the arrangements that

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[Footnote 23, cont'd]

from the patented plant. Since plaintiff's claim of infringement will be denied on other grounds, however, there is no need to discuss the asexual reproduction question in detail."

24 Anonymous, Plant Patents Criticisms and Suggestions, JPOS, 1934, pp. 184-185; Anonymous, Plant Patent Symposium, JPOS, 1934, pp. 252-255.

25 D.H. Sweet, Disclosure in Plant Patents, JPOS, 1934, pp. 661-663.

26 Anonymous, Convient-t-il d'accorder des brevets pour les produits chimiques, alimentaires et pharmaceutiques, PI, 1885, 49-51 (this article attempted to explain that the fears were not justified). In the Federal Republic of Germany, for instance, the exclusion of inventions relating to foodstuffs, alcoholic beverages and tobacco (Genussmittel), medicaments, and substances produced by chemical processes, which was quite commonplace in the first part of this century, was removed in 1967 only.

27 e.g. France (Decree of December 5, 1922, concerning the Introduction of a Register for Newly-bred Plants and the Setting-up of a Seed Control Committee, see PI, 1923, pp. 28-29) and The Netherlands (setting-up of the Netherlands General Department for the Control of Agricultural Seed and Potato Seedlings (NAK) in 1932).

had already been made on a private or semi-official basis.[28] Through the exclusive use of control signs and of denominations, the breeder was to be given an improved position, at least on the high-quality seed market. In some instances, however, that position was soon to be eroded again.[29]

Czechoslovakia.- Czechoslovakia was to take the lead with its Law on the Recognition of the Originality of Types, Seeds and Seedlings, and the Testing of Horticultural Types[30]. It provided in particular that the entry into one of the registers or lists held for the plant material of the various kinds entitled the registered horticulturalists and producers to put their material into commerce, but only under the registered indications (but other seed or plant owners could obtain the same authorization from the Qualification Committee). In addition, individuals and establishments who produced original material were the only ones allowed to make use of a registered trademark.

Germany.- Of particular interest in the context of the background to the UPOV Convention is the draft Seeds and Seedlings Law submitted to the German Parliament in 1930, i.e. in the same year as the United States Plant Patent Act was adopted[31]: it contained a chapter on the "Protection of the Breeder." Such protection was to be available for new varieties, that were distinguishable from existing varieties by important characteristics that were inheritable or transferable by vegetative propagation and also capable of being shown experimentally. This language announces Article 6(1)(a) of the UPOV Convention. Varieties obtained by a mere selection within an existing variety had, in addition, to reflect important or substantial (erheblich) progress, which could also be accepted if its expression was limited geographically. The anticipation of the issue of 'dependence' or 'essentially derived varieties' currently dealt with in the framework of the revision of the Convention is remarkable.

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28 For instance, the first seed testing station seems to have been established in 1869 at Tharandt in Germany by Professor F. Nobbe, who published his Handbuch der Samenkunde in 1876. The first Austrian seed testing station was founded in 1881 by the Agriculture Society, and the first Swiss in 1871 (see R. Meinx, 100 Jahre Bundesanstalt für Pflanzenbau und Samenprüfung in Wien - 1881 bis 1981, Festschrift, Eigenverlag, 1981). The first Danish seed testing station was set up in 1871 in Copenhagen under the management of Möller-Holst, and the first Swedish in 1876 following an initiative of the Royal Academy of Agriculture (see H. Esbo, Swedish Seed Testing 100 Years, Berlingska Bocktryckeriet, Lund, 1975, 140 p.).

29 So in Germany, where, in 1920, the Oberstes Landgericht (Kammergericht) of Prussia decided that third parties could use a trademark relating to a variety in conjunction with 'Nachbau' when putting on sale a generation of seed following those of "elite" (produced under the supervision of the breeder) or "original." The Chamber of Agriculture of the province of Brandenburg played a leading role in this highly controversial decision.

30 No. 128 of March 17, 1921. See PI, 1922, pp. 70-71 (the translation, itself based on a translation from German, may not be reliable).

31 See GRUR, 1930, pp. 244-251.

The proposed effect of protection related as in Czechoslovakia to the use of additions to the variety denomination; however, the exemptions for trade not using the written form or in respect of later generations, or again for trade without use of the denomination or with the use of a different one would have offered vast opportunities for competitors to tap in on the breeder's achievement. A further exemption was made in favor of direct exchanges between seed producers and users, relating to quantities to be specified, where the firm's own facilities were used for transport. A somewhat analogous exception has been written 40 years later into the Plant Variety Protection Act of the United States of America.[32] Finally, the draft authorized registration of a variety denomination as a trademark, but prohibited the assertion of the trademark in certain circumstances, a principle which will be found in the original text of the UPOV Convention.

The draft never became law, however, and the Law of June 27, 1953, on the Protection of Varieties and the Seeds of Cultivated Plants (Seed Law)[33] had to be awaited to see the efforts to do justice to the breeder recompensed. That Law played a substantial part in the making of the UPOV Convention.

Under Article 1, the purpose of protection was to promote the creation of useful (wertvoll) new varieties of cultivated plants. Consequently protection was reserved for varieties produced by breeding or improvement (Züchtung), which were of agronomic value. An exception was provided, however, for non-food plants and for varieties intended for export. In addition, the variety had to be "individualized" and stable. The individualization criterion corresponds more or less to the present concept of distinctness written into Article 6(1)(a) of the UPOV Convention, and also to the distinctness concept in the 1930 draft.

Protection conferred on its owner the exclusive right to produce seed of the protected variety for the purposes of the seed trade, to offer them for sale and to market them. So protection was now immediate, and no longer contingent on use of the denomination. Export of one of the first generations of multiplication (Hochzuchtsaatgut) was subject to specific authorization by the breeder.[34] Conversely--and this is a throwback to the past--the production and marketing of certified derived seed could be carried out without restriction, but against payment of remuneration to the breeder, when certification was provided for (Article 13). Finally the principle of the freedom of use of the seed of a protected variety for the creation of a new variety was expressly stated; this anticipates Article 5(3) of the UPOV Convention.

Anyone who marketed seed of the protected variety had to use the variety denomination, as provided subsequently in Article 13(7) of the UPOV Convention.

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32 Public law 91-577 of December 24, 1970, Section 113. See Plant Variety Protection No. 37.

33 Bundesgesetzblatt, 1953, Part I, pp. 450-462.

34 This provision is still a feature of the Plant Variety Protection Law of the Federal Republic of Germany (Article 10, item 4, of the Law of December 11, 1985; see PVP, No. 51). It is also contained in the Hungarian Law on the Protection of Inventions by Patents (Article 68(2); see PVP, No. 49). The insertion of a similar provision into the UPOV Convention is being considered.

If the denomination was the subject of a trademark registered in favor of the owner of protection, the latter could not prohibit the use of the denomination where such use was compulsory or alternatively permitted, in the case of certified derived seed. This provision was severely criticized by the lawyers as being contrary to the fundamental principles of trademark law. Yet that did not prevent it from giving rise, in Article 13(3) of the UPOV Convention, to provisions that were similar in principle.

Netherlands.- Yet the Seed Law was not the first to provide for breeders' rights in Europe: it was preceded by the 1941 Breeders Ordinance of the Netherlands, published on July 5, 1942.[35]

This text was also concerned both with breeders' rights and with the regulation of the seed trade. From the latter point of view it introduced, for certain species, a system for the cataloging of varieties passed for marketing. The seed of those varieties could only be marketed under a registered denomination; in addition, they had to be tested. When seed of an inferior category was tested, a fee was charged for the benefit of a fund to remunerate breeders.

In the case of species that were not subject to cataloging, the breeder was granted the exclusive right for twenty-five years to market the seed of his variety (mandatory use of the registered denomination was also provided for varieties of such species). In the case of the other species, the right related only to the first generation of seed ("original" or "elite" seed) and to the grant of a royalty drawn from the remuneration fund.

The Exploration of the Patent Avenue

Germany.- The Dutch Ordinance was the first to introduce a breeder's right similar to the minimum right provided for in Article 5(1) of the original text of the UPOV Convention, albeit in respect of ornamental plants only. Those plants were excluded from the scope of the German Seed Law. Their protection could therefore only be obtained through patents. In this respect, on account of the evolution of the situation since the 1930's and with a view not to upset the patent circles, the Seed Law contained a provision to ensure a smooth operation of both systems in the case of 'double protection', an issue which is currently topical: the rights deriving from the patent could only be exercised to the extent that they were not at variance with the provision of the Seed Law.

The efforts to have the patentability of plant varieties accepted started in the early 1930's in Germany.[36] The figureheads in this movement were Franz and Freda Wuesthoff, who also played a major role in AIPPI. The first positive decisions of the Beschwerdesenat (appeal body) were issued in 1934 in

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35 See PI, 1944, pp. 44-48.

36 Detailed accounts can be found in recent contributions published by the Max-Planck Institute, in particular R. Moufang, Genetische Erfindungen im gewerblichen Rechtsschutz, 1988, 401 p., and H. Neumeier, Sortenschutz und/oder Patentschutz für Pflanzenzüchtungen, 1990, 247 p.

relation to "tobacco seed" and "lupin seed" and in 1936 in relation to "seed of a small-seeded garden pea." But owing to opposition and pressure from the Reichsnährstand based on considerations of agricultural policy, the applications were subsequently withdrawn. What was then left was a lively debate in doctrine over the patentability of plant varieties. Strong views were voiced against the patentability on the basis of patent law considerations; the lupin seed application, which had been extensively commented on by the Wuesthoff's, in fact showed that obstacles were to be overcome through clever formulation of the claims.

Patents were then granted after the war, mainly for ornamental plants, but the continuing controversy over the patentability of varieties and the need to resort to carefully drafted claims of dubious validity did not make the patent an efficient form of protection. The advent of the UPOV Convention, the celebrated "red dove" decision handed down in 1969 by the Supreme Court,[37] and the magistral analysis thereof by H.G. Hesse[38] then closed the debate until the advent of 'biotechnology.'

Other West-European countries.- The relation between patents and varieties was quite as hectic in France following a decision handed down by the Nice Commercial Tribunal on March 23, 1921, in re Valuy v. Brun which stated that "the creator of a flower has no proprietary right in his creation, as no law recognizes the existence of such a right."[39] Several attempts made between June 1921 and 1930, in particular by Deputy Humbert Ricolfi, to 'create or regularize horticultural patents' or introduce 'agricultural and horticultural property' failed, not least because patent specialists had claimed that the matter was covered by the patent law.

The first patent was then issued in 1949, after the celebrated rose breeder Francis Meilland secured the assistance of the Ministry of Agriculture and the Industrial Property Office for the drafting of a patent for the rose 'Rouge Meilland-Happiness.'[40] That patent was then to serve as a model for applications in Belgium, where the patentability of varieties was subsequently affirmed by the First Instance Court of Termonde by a decision of May 2, 1958.[41]

In Italy, the decision of the Appeal Board of the Central Patent Office of April 9, 1948 (which concerned a process for the "formation of Plants having

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37 GRUR, 1969, pp. 672-676 (with a note by Heydt).

38 Zur Patentierbarkeit von Züchtungen, GRUR, 1969, pp. 644-653.

39 The decision related to the alleged theft of some 1000 cuttings of a carnation variety during the First World War, whilst its breeder was serving in the army (see M.-A. Hermitte, Histoires juridiques extravagantes - La reproduction végétale, in: B. Edelman et M.-A. Hermitte, L'homme, la nature et le droit, Christian Bourgeois éd., 1988, p. 42).

40 B. Laclavière, The French Law on the Protection of New Plant Varieties, IP, 1971, pp. 44-47.

41 See GRUR, 1959, pp. 395-397.

several root systems"), recognized patentability in the plant world.[42] Francis Meilland then obtained his first patent on November 5, 1951. As in France and Belgium, many patents have been granted, almost exclusively for ornamental plants, mainly roses and carnations. But the breeder's position remained most insecure owing to differing case law.[43] By that time, the usages and practices of the trade had offered an alternative in relation to the cut flower production: the system of contracts based on the lease or rent of plants, which had developed first in the Province of Imperia, was acknowledged in 1949 by the Chamber of Commerce, Industry and Agriculture of the Province in its Official Compilation of Usages and Practices and affirmed by case law.[44]

Francis Meilland was unsuccessful, however, in Switzerland, where a ruling of the Federal Tribunal was handed down on January 27, 1953.[45] In countries such as Denmark, the Netherlands and the United Kingdom, patents were not available.[46]

In Spain, some rose varieties were granted utility model protection.[47]

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42 L. Lodi, La tutela delle novità vegetali nell'ordinamento giuridico italiano e nelle legislazioni estere, Edagricole, 1976, 195p.

43 A series of tribunals affirmed the validity of the granted patents in infringement proceedings; another affirmed patentability but declared the patent at issue null and void on account of insufficient description (this decision hit in particular the famous rose 'Baccara'); a third found the patent laws to be inapplicable to living matter (see L. Lodi, op. cit.).

44 On this interesting development, see L. Lodi, Usage, Practices and Contracts for the Distribution of New Plant Varieties, UPOV Newsletter No. 10 (September 1977), pp. 5-12.

45 The Tribunal considered that the invention was not in the variety itself, because the creative activity would not be deployed in the course of its propagation, which would occur through known methods. It lay in its creation, which, however, was not repeatable, a fact which resulted in a lack of industrial applicability.

46 Although a patent containing a product claim had been granted for a process for the production of fast-growing trees in the United Kingdom. On February 24, 1954, the Patents Appeal Tribunal rejected an application by N.V. Philips Gloeilampenfabrieken for a process for the cultivation of a poinsettia on the ground that it was not a "manner of manufacture" to modify the conditions under which natural phenomena take their inevitable course. The same application was rejected in the Netherlands on account of a narrow interpretation of the term 'industry' (decision of the Appeal Board of the Patent Office of February 6, 1958). It was upheld on appeal in the Federal Republic of Germany. See H. Schippel, Zur Patentierung landwirtschaftlicher Kulturverfahren, GRUR Int., 1958, pp. 333-337 and the decisions, ibid., pp. 337-339.

47 See Actes des Conférences internationales pour la protection des obtentions végétales, 1957-1961; 1972 (Actes de 1957-1961; 1972), UPOV, 1974, at p. 24, at J.G. Reixach, La protection juridique des nouveautés végétales en Espagne, PI, 1955, pp. 119-120.

In Austria, the Federal Law of December 12, 1946, on the Protection of Austrian Plant Breeding (Law on Plant Breeding)[48] offered some protection to breeders on the basis of the well known obligations imposed on the seed trade since Czechoslovakia paved the way for them in 1921. But Austria also offers us an example of successful recourse to competition law: the Supreme Court indeed held on October 9, 1957, that it was unlawful to propagate a new variety without the consent of the breeder and market it under another denomination.[49]

Hungary.- The evolution of the situation in the East-European countries had no impact on the advent of the UPOV Convention. Nevertheless, the description of the background to the UPOV Convention would not be complete if no mention were made of the evolution in Hungary.

A curious second-hand report appeared in Le Droit d'auteur in 1941.[50] It was then reported that according to an article published in Pester Lloyd, "breeders have been assured by the official circles that the provisions of copyright law would soon be extended to their products..." The editor wondered whether the term 'Urheberrecht' appearing in the communication he received was correct, but if it was, then Hungary would have been the first to point to the similarities in the exploitation of e.g. printed works and varieties. It may also be that the report referred to the system of plant qualification which was introduced in the same year.

Patents were then granted under the old patent law, on account of the definition appearing in Article 1(3) of the Paris Convention of 1883[51] and the absence of a definition in the law. Pálos[52] noted that the same difficulties arose in Hungary as in other countries from the exclusion of products used as human or animal food, from the provision whereby biological processes were refused protection, and from the definition of the right--which was to manufacture and sell the invention. And he concluded that the protection afforded was not adequate.

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48 Bundesgesetzblatt, February 26, 1947, pp. 309-313. For an analysis in a historical perspective, see R. Hron, Sortenzulassung und Sortenschutz in Oesterreich, in Festschrift - 100 Jahre Bundesanstalt für Pflanzenbau und Samenprüfung in Wien - 1881-1981, op. cit.

49 "Concerto" decision. See GRUR, 1959, p. 397.

50 Anonymous, Sur la protection des nouveautés végétales, pp. 119-120.

51 "Industrial property shall be understood in the broadest sense and shall apply not only to industry and commerce proper, but likewise to agricultural and extractive industries and to all manufactured or natural products, for example, wines, grain, tobacco leaf, fruit, cattle, minerals, mineral waters, beer, flowers, and flour."

The interpretation according to which all branches of industrial property should apply to all quoted activities and products seems, however, far-fetched.

52 The New Hungarian Law on Inventions, PI, 1969, pp. 254-259.

This was in fact the conclusion of the Government, since it led to the currently applicable patent law[53] which contains a special part on the protection of plant varieties and--this is an innovation--animal breeds along the lines of the UPOV Convention. That law formed the basis for Hungary's accession to UPOV in 1983.[54]

The Contribution by the International Non-governmental Organizations

A decisive role in the elaboration of the UPOV Convention is to be recognized to the International Association for the Protection of Industrial Property (AIPPI) and to the International Association of Plant Breeders for the Protection of Plant Varieties (ASSINSEL). They were about the only NGO's, with the International Chamber of Commerce, which promoted the idea of protection for plant varieties and paved the way for an international conference on the subject.

The AIPPI has been concerned with the issue since 1932, under the enthusiastic leadership of the Wuesthoff's. But the issue could only be placed, as a major question, on the agenda of the Vienna Congress in 1952. Various texts were adopted at that congress and at further events, a token of the impossibility for industrial property lawyers to achieve a common position.[55] It remains however that, in the Notes of invitation to the 1957 Paris Conference, the AIPPI was the first organization whose activities were referred to. In particular, it was noted that "at the close of its Congresses of Vienna (1952) and Brussels (1954), it expressed wishes to the effect that protection for new plant varieties be provided on the basis of the patent for invention or of any other means."[56]

ASSINSEL was founded in 1938 and was soon to pass a resolution asking for the international recognition of the filing of trademarks and appellations as a means of protection (pending introduction of a patent), for the adoption of the principle of a license to be drawn up by ASSINSEL for the purposes of multiplication and sale, and for the acceptance of the notion of 'original seed' being seed produced, offered or sold by the breeder of the variety or under his control by his licensees or successors in title.[57]

After the war, and after it had realized that the patent route was in fact a blind alley, it passed in June 1956 in Semmering (Austria) an emphatic resolution calling for the organization of an international conference to consider the question of protecting plant varieties officially, and if possible to lay

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53 Law on the Protection of Inventions by Patents (No. II of 1969, as amended by Decree-Law No. 5 of 1983) (See PVP No. 49).

54 The instrument of accession was deposited on March 16, 1983.

55 For the evolution, see A. Heitz, The History of Plant Variety Protection, in: The First Twenty-five Years of the International Convention of the Protection of New Varieties of Plants, UPOV, 1987, pp. 53-96.

56 Actes de 1957-1961; 1972, p. 13.

57 Congress of July 8 and 9, 1939, held in Paris.

down principles to govern that protection. France was approached for the organization of such a conference. This resolution then served as the basis for the invitations to the 1957 Paris conference. The Notes mention their strong wish that "an international convention sanction the established practices and facilitate the international trade with new plant varieties."[58]

The Discussions on Patents at International Level

If the ASSINSEL resolution--which had been carefully prepared with the French authorities[59]--opened the way for an international conference, its success was dependent upon the removal of the patent cloud; the controversy over the patentability of plant varieties, which in effect paralyzed both the partisans and opponents of patentability, had to be set aside. This task fell on the patent experts under the auspices of the Council of Europe and the Paris Union for the Protection of Industrial Property, which was administered by the United International Bureaux for the Protection of Industrial, Literary and Artistic Property (BIRPI).

An unprecedented move towards harmonization and integration in the field of patents was initiated by the Council of Europe, almost immediately after its inception, on May 5, 1949. It was to produce the Convention on the Unification of Certain Points of Substantive Law on Patents for Inventions, signed in Strasbourg on November 27, 1963,[60] and the Convention on the Grant of European Patents (European Patent Convention), signed in Munich on October 5, 1973.[61] The former provided in its Article 2 that "the Contracting States shall not be bound to provide for the grant of patents in respect of [...] plant or animal varieties or essentially biological processes for the production of plants or animals; this provision does not apply to micro-biological processes and the products thereof." The latter provided in its Article 53 for an exclusion of that subject matter from patentability under it. This principle seems to have been agreed upon at a rather early stage, and in any event before the adoption of the UPOV Convention.[62] Some of the experts who worked on these important texts also participated in the drafting of the UPOV Convention, and therefore ensured a welcome coordination.

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58 Actes de 1957-1961; 1972, p. 14.

59 B. Laclavière refers to this fact in a number of his publications.

60 See IP, 1964, pp. 13-15.

61 See IP, 1974, pp. 51-89.

62 The explanations given by K. Pfanner, Vereinheitlichung des materiellen Patentrechts im Rahmen des Europarates, GRUR Int., 1962, pp. 545-554, are now increasingly taken to mean that plant varieties are excluded from patent protection only to the extent that they are covered by the plant variety protection system. The report given by G. Finniss, Rapporteur-General, to the Committee of Experts on Patents on November 28, 1960, (unpublished) indicates, however, that the concurrent work on a plant variety protection system was only incidental:

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The Paris Convention for the Protection of Industrial Property of March 23, 1983, was to be revised in a Diplomatic Conference held in Lisbon from October 6 to 31, 1958. In 1955, a meeting of experts responsible for preparing that Conference agreed not to include the question of new plant varieties in the Conference agenda because, in the experts' opinion, it was not yet ready for inclusion.[63] The representatives of member States also resisted in the course of the Diplomatic Conference the attempts by AIPPI and the ICC to have that question, or the question of the creation of a catalog of agricultural and horticultural novelties, examined.[64] As a result of a misunderstanding, a proposal attributed to the observer of FAO led to the entry of the question of plant novelties on the agenda of Committee I and its withdrawal on the next day since "no delegation of a Unionist country took up such request."[65] The International Bureau of BIRPI itself tried, also in vain, to keep the emerging UPOV Convention within the framework of the Paris Convention, by giving it the form of a special agreement. Equally in vain was its attempt to make the representatives of member States--mainly patent office directors--aware of the risk of drift, and then of the actual drift towards a specialized Convention and Union. Thus those responsible for industrial property in the Paris Union as a whole, through their resistance, left the coast clear for the Paris Conference and the UPOV Convention.

The Emergence of a New Convention and a New Organization

The proceedings of the two conferences which were held in Paris from May 7 to 11, 1957, and from November 21 to December 2, 1961, and of the various

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[Footnote 62, cont'd]

> "A constructive effort to harmonize the European systems should aim at reconciling current conceptions in the limited sector just described, which is where the divergences are found.
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> [...]
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> "It would be highly inexpedient to try to impose a common solution for the highly controversial question of the patentability of new plant varieties."
>
> [...]
>
> "It is known, moreover, that the legal protection of plant varieties is at present under study in another context, following the French Government's initiative in calling a conference in 1957, attended by the majority of European countries, with the object of drafting a convention on the subject."

63 See Die Lissaboner Konferenz zur Revision der Pariser Verbandsübereinkunft, GRUR Int., 1959, p. 59.

64 The requests are published in Actes de la Conference réunie à Lisbonne du 6 au 31 octobre 1958, BIRPI, 1963, pp. 973-974.

65 See Actes de la Conference réunie à Lisbonne du 6 au 31 octobre 1958, BIRPI, 1963, p. 305, and Die Lissaboner Konferenz zur Revision der Pariser Verbandsübereinkunft, GRUR Int., 1959, p. 80.

committees[66] will not be described here, since the sources are limited in number[67] and since an account has already been given elsewhere.[68] In addition, such a description would impinge on the contributions of the other speakers.

To maximize the chances of success,[69] the French Government issued invitations to twelve countries only, all from Western Europe, which were known to share the same concerns and the same hopes (Austria, Belgium, Denmark, Finland, Federal Republic of Germany, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland, the United Kingdom). All were to participate at one stage or another in the elaboration of the UPOV Convention.[70]

The Rationale of Plant Variety Protection.- The Notes of invitation had been carefully drafted and hinted to the desirability of a (special) system of protection. Particular emphasis was placed on the promotion of the seed trade. We have already noted the wish of ASSINSEL in this connection. The Notes also mentioned the fact that the European Conference on the Development of Seed Production and Trade held in Stockholm in July 1954 had made some conclusions in respect of plant variety protection. After referring to the special needs of agriculture, they concluded that "it appears therefore desirable to reach an agreement among the various countries which are favorable to the promotion of the seed trade on the principles which should govern the protection of new plant varieties and, if possible, on the appropriate institutions to ensure such protection." They also suggested that the conference "might have the main

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66 In chronological order:

Paris, April 22-25, 1958	Committee of Experts, first meeting
Paris, September 16-19, 1958	Committee of Experts, second meeting
Paris, January 8-9, 1959	Drafting Committee
Paris, April 2-3, 1959	Drafting Committee
Munich, June 30 - July 3, 1959	Committee of Experts, third meeting
Paris, November 4, 1959	Group of Legal Experts on the Relation Between Protection of the Names of New Plant Varieties and Trademark Protection
Paris, January 18-19, 1960	Group of Legal Experts on the Relation Between the Paris Convention for the Protection of Industrial Property and the Preliminary Draft of the Convention for the Protection of New Varieties of Plants
Paris, January 20-23, 1960	Drafting Committee
Rome, February 15-20, 1960	Committee of Experts, fourth meeting
Paris, April 20-22, 1960	Drafting Committee

67 Actes de 1957-1961; 1972, op. cit., and H. Schade & K. Pfanner, Das internationale Uebereinkommen zum Schutz von Pflanzenzüchtungen, GRUR Int., 1962, 341-364.

68 A. Heitz, op. cit.

69 B. Laclavière, personnal communication.

70 Finland and the United Kingdom were not represented at the first conference. The United Kingdom participated actively in the subsequent work. Finland participated in the second conference, whereas Norway did not.

purpose to study the technical aspect of the problem, taking into account in particular the requirements of the seed trade," whereafter the participating States could discuss the usefulness of a new convention containing the common principles that could have been agreed upon, either in the form of a special agreement under the Paris Convention of 1883 or "in the form of a convention establishing a distinct international Union which would be open to any State wishing to adhere to it."

At the opening of the first conference, the Under-Secretary of State for Agriculture Kleber Loustau further referred to the principle of equity as between breeders, inventors and authors--a principle that had already been used emphatically at the beginning of the century in the United States of America[71]--and, more generally, to Article 27(2) of the Universal Declaration of Human Rights.[72]

Kleber Loustau could not ignore the objection that "it would be contrary to the interest of mankind to allow monopolies over agricultural products which are indispensable foodstuffs." He replied that it was "a pressing need to promote research in all its forms, public or private, individual or collective," and that "according to an expression in use in a neighboring country, research is 'tomorrow's bread'."

He further stated that "it is beyond doubt that in the absence of any governmental control one could indeed fear monopolistic or malthusian attempts which could slow down the spreading of valuable new varieties." And he concluded with the needs of international trade and the growing internationalization of economic activity.

All these considerations were to find their way into the Preamble to the original text of the Convention and to be reaffirmed at the revision of 1978.[73] They can also be found, for instance, in the full title of the

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71 Luther Burbank, a famous plant breeder, has expressed this principle in the following terms before the House of Representatives:

> "A man can patent a mousetrap or copyright a nasty song, but if he gives to the world a new fruit that will add millions to the value of the earth's annual harvests, he will be fortunate if he is rewarded by so much as having his name connected with the result."

72 "Everyone has the right to the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he is the author."

73 "The Contracting States,

"Convinced of the importance attaching to the protection of new varieties of plants not only for the development of agriculture in their territory but also for safeguarding the interests of breeders,

"Conscious of the special problems arising from the recognition and protection of the rights of breeders and particularly of the limitations that the requirements of the public interest may impose on the free exercise of such a right,

[Cont'd]

Plant Variety Protection Act which was enacted on December 24, 1970, by the United States of America to complement its Plant Patent Law in respect of sexually reproduced varieties.[74]

How, and how much, the UPOV Convention has served the purpose in practice will be described in the excellent paper by F. Desprez.[75]

The Basic Principles of the UPOV Convention.- In the final analysis, the basic principles of the protection system were already set out in the Final Act adopted on May 11, 1957.

With regard to the technical conditions to which the grant of a title of protection was to be subject, the conference agreed that the variety had to be distinct from pre-existing varieties, sufficiently homogeneous and stable in its essential characteristics, and that the artificial or natural origin of the initial variation that gave rise to it was of no consequence. The condition of distinctness was to be amplified subsequently to read "clearly distinguishable by one or more important characteristics." The adjective, "important" was adopted "in spite of its imprecision, because it does not seem possible to protect a variety that has only minimal differences." The origin of the variety to be protected was also carefully examined. After having agreed that the mere selection of a genotype from among those included within a pre-existing variety would not be a creative act affording a right to protection and that there should be a requirement of effective work on the part of the breeder, the experts finally adopted the solution that had been written into the United States Plant Patent Act 30 years earlier.

With regard to the fundamental right of the breeder, it decided that it was to relate to the trading of seed and seedlings of the variety and reserved the question of extension to the marketed product (foliage, flowers or fruit) in the case of ornamentals. No agreement could be reached subsequently on the latter point, so that the second conference decided to provide for a minimum scope of protection with a possibility for extensions.

[Footnote 73, cont'd]

> "Deeming it highly desirable that these problems, to which very many States rightly attach importance, should be resolved by each of them in accordance with uniform and clearly defined principles,
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> "Anxious to reach an agreement on these principles to which other States having the same interests may be able to adhere."

74 "An Act to encourage the development of novel varieties of sexually reproduced plants and to make them available to the public, providing protection available to those who breed, develop, or discover them, and thereby promoting progress in agriculture in the public interest."

75 See also P.W. Murphy, Plant Breeders' Rights and the Improvement of Plant Varieties, in: The Use of Genetic Resources in the Plant Kingdom, UPOV, 1981, pp. 27-34, and Valerie Silvey, The Influence of Improved Crop Varieties and Husbandry Methods on Increased Cereal Yield, ibid., pp. 35-39.

The first conference also stated the principle of the free use of the variety as parent material in breeding work.

It acknowledged the principle of the independence of protection in relation to the systems governing seed and seedlings and stated the principle according to which a variety not entered in the catalog of varieties passed for marketing could also be protected (in other words, in practice, the fact of not having sufficient value for cultivation and use for entry in the catalog was no bar to protection. The usefulness criterion was to be reconsidered subsequently, and discarded again.

Finally, at the first meeting of the Committee of Experts, it was agreed that the breeder should be placed under the obligation to ensure maintenance breeding of the variety during the period of protection. That obligation--which is also one justification for the plant variety protection system--was subsequently written into the Convention in the form of a ground for forfeiture in the event of failure to comply.

The Impact of the Patent Controversy.- Whereas the first conference was able to reach agreement on the "technical aspect of the problem"--and meet the expectations of the organizers--the experts were soon to be confronted with the spinoffs of the patent controversy. Naturally, the representative of BIRPI took great pains to ensure that the emerging convention would find its place under the Paris Convention of 1883 and, when that became unlikely, that it would not contain conflicting provisions. This must have been the objective of other delegates throughout the preparatory work.

This led in particular to the inclusion of a provision on priority, although the experts noted that the question of the right of priority did not arise in the same way for new varieties of plants as it did for industrial inventions. They therefore adopted the principles governing that right in the Paris Convention, but adapted them: the breeder who claimed the right of priority within the Convention time limit of twelve months was to be granted an additional period of four years within which to provide the additional documents and the plant material for testing. In addition, he was to be granted a period of five years within which to file applications in other countries (without claiming priority); in that case no disclosure or exploitation that occurred during the intervening period could be held against him if it concerned his own variety.

Later on, the experts realized the need to distinguish between 'distinctness'--a technical requirement--and 'novelty'--a legal requirement for protection. To protect a conscientious breeder who would test the commercial potential of his variety before filing an application for protection, they proposed that such tests, or an application for entry in a catalog, or an entry in such a catalog would not be held against the breeder if his own variety had not been the subject of an act of effective marketing on the territory of the State concerned. At the second conference, the proposed provisions were reorganized: the requirement that there should be no act of marketing was extended to all applications (i.e. to the initial application and to the subsequent ones, with the effect that there is no time limit for filing subsequent applications), but restricted to the country of application; the five-year 'period of grace' was reduced to four and made applicable to all applications, but restricted to countries other than the country of application (Article 6(1)(b) of the UPOV Convention).

Contrary to what happens under patent law, novelty is not affected by the publication of the variety (in the form of the publication of its description or the exhibition of plants of the variety). This is due to the fact that a description is not sufficient to make the variety available to the public. In the same way, the mere publication of its breeding history does not enable a person skilled in the art to 'recreate' the variety; this is one of the reasons for which the breeding history is usually not published in connection with the grant of plant breeders' rights. Another reason is the fact that the breeding history is frequently not known, in particular when recurrent selection is applied, or of no practical value, in particular when the genitors are not maintained. The absence of publication of the breeding history does in no way disrupt the balance of the 'deal' between the State and the individual who is granted a temporary monopoly right (for a minimum of 15 or 18 years, as the case may be, under the UPOV Convention): the individual meets his part of the deal by marketing the variety.

The refinement of the novelty condition had a consequence on the distinctness rule, which was to be related, not to any variety being a matter of common knowledge, but to any other such variety. The term 'other' is somewhat troublesome insofar as the concept of variety does not leave room for the concept of 'identical varieties'; in essence it refers to the competitors' products, whether identical or not clearly distinguishable by one or more important characteristics, and to the applicant's own products that are not so distinguishable (the case of identity would be dealt with under the novelty condition).

These provisions were slightly amended at the 1978 revision, whose purpose was to enable accession to the Union by further States, primarily the United States of America which, for the historical reasons outlined in this study, had developed a protection system that was not fully in line with the principles of the UPOV Convention.[76] Member States were authorized to reduce the four-year period arising from a priority claim in the case where the priority application was rejected or withdrawn--to eliminate any abuse of the priority provisions. The four-year period under the novelty requirement was extended to six in the case of trees and grapevine, and member States were given the possibility of

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76 The Preamble to the International Convention for the Protection of New Varieties of Plants of December 2, 1961, as Revised at Geneva on November 10, 1972, and on October 23, 1978, contains the following statements:

> The Contracting Parties,
> [...]
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> "Considering that the idea of protecting the rights of breeders has gained general acceptance in many States which have not yet acceded to the Convention,
>
> "Considering that certain amendments in the Convention are necessary in order to facilitate the joining of the Union by these States,
>
> "Considering that some provisions concerning the administration of the Union created by the Convention require amendment in the light of experience,
>
> "Considering that these objectives may be best achieved by a new revision of the Convention."

introducing a one-year period of grace in respect of marketing in the State of application. Furthermore, newly adhering States providing for protection under two forms for the same genus or species (through a special title of protection and patents) were given the possibility of continuing to apply the patentability criteria and the period of protection of the patent legislation to the varieties protected thereunder. This provision had been tailored for the United States of America in view of the unlikelihood of an amendment of the Plant Patent Act to bring it into conformity with the UPOV Convention; the United States of America were also the only State to make use of that provision.

The forms of protection just mentioned were one of the major issues dealt with between 1957 and 1961. The Netherlands were strictly opposed to a system under the Paris Convention of 1883, owing to their opposition to patents in the field of agriculture.[77] Other countries were not ready to accept one form and exclude the other. It is significant in this respect that it was only in preparation for the second conference that the Government of Italy stated that some of the proposed provisions were incompatible with its previous commitments under the Paris Convention of 1983, and thereby clearly signalled its intention to use the patent system.[78] According to the report made by the Italian group of AIPPI to the AIPPI Congress of Vienna in 1952, a draft law to complement the Patent Law was under consideration at that time; it provided in effect for the introduction of a plant patent system comparable to that of the United States of America. But it also corresponded to a text drawn up by a joint Franco-Italian commission which met in December 1950. The time needed in France to pass a plant variety protection law[79] is a further indication that the matter was not finally decided even after the adoption of the UPOV Convention. Indeed it seems that France has considered for quite some time a solution along the lines of the system applied in the United States of America.

Throughout the preparatory work, the consensus among the experts was that member States should be free to choose the form of protection deemed most appropriate to their national circumstances. To that effect they did their utmost to adopt no provision which would prohibit the protection under the patent for invention. States choosing that form would be bound by two sets of obligations. And the majority of the experts had simply expressed the wish that, for varieties of the same botanical species, there should be only one form of protection in any given State.[80]

However, at the Conference of 1961, a text was adopted with the following wording (Article 2(1)): "Each member State of the Union may recognize the

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77 See footnote 46 above. The same objection led to a provision in the Convention on the Unification of Certain Points of Substantive Law on Patents for Invention was adopted affording Contracting States the option of not providing, for a transitional period, for the grant of patents in respect of agricultural or horticultural processes.

78 See page 77 of the Acts of 1957-1961; 1972.

79 The law was adopted on June 11, 1970, and France was only the fifth country to ratify the UPOV Convention.

80 See in this respect, on page 70 of the Acts of 1957-1961; 1972, the report by Mr. J. Bustarret, President of the Committee of Experts.

right of the breeder provided for in this Convention by the grant either of a special title of protection or of a patent. Nevertheless, a member State of the Union whose national law admits of protection under both these forms may provide only one of them for one and the same botanical genus or species."

No explanation to this text has been recorded in the Acts. For a number of years, its interpretation has been teleological and based on the fact that Belgium, France, the Federal Republic of Germany and Spain--the States which have granted patents in the past, but have introduced a special system of protection--have left open the possibility of obtaining a patent for invention in respect of a plant variety, restricting that possibility to the species not covered by the special system. According to that interpretation, "both these forms" would refer to patents not recognizing the right of the breeder "provided for in this Convention", which would entail a contradiction between the two sentences of Article 2(1). A historical interpretation, while respecting the text, would make the provision irrelevant both for the past (since no State has introduced a dual system of protection) and for the future (since no State is likely to make the effort of introducing a specially-tailored piece of legislation and, at the same time, of adapting an existing one to the UPOV Convention). In any event, it is the teleological interpretation which gave rise in 1978 to the special derogation for protection under two forms contained in Article 34(1) of the currently applicable text.[81]

The fathers of the Convention were also keen to introduce a system based on an examination of the variety undertaken by official services. This principle was to be softened later on to accomodate the system in force in the United States of America, and also to allow a broader coverage of the plant kingdom with the protection system.[82] It implied originally a progressive application of the Convention to the various genera and species. To ensure a certain degree of uniformity, they established a list of such taxa whose protection was to be achieved within a period of eight years. That list was to be deleted in 1978 as it was only relevant under west-european circumstances. As a compromise, they also agreed that member States had to apply national treatment in respect of the listed taxa, but were free to apply reciprocity in respect of the others.[83] For the purposes of Italy, a paragraph was added which enabled it to declare that it would apply Articles 2 and 3 of the Paris Convention of 1983.

The Organizational Set-up.- The patent controversy also reflected on the organizational set-up. Very soon it became clear that the emerging convention would not be placed under the umbrella of the Paris Convention of 1983 as strong opposition was voiced against this. The fathers of the Convention

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81 "Any member State of the Union which, on the day on which this Act enters into force with respect to that State, is bound by the Convention of 1961 as amended by the Additional Act of 1972 shall, in its relations with any other member State of the Union which is not bound by this Act, continue to apply, until the present Act enters into force also with respect to that other State, the said Convention as amended by the said Additional Act.

82 See Records of 1978, p. 25.

83 This principle is to be done away under the current revision exercise.

therefore decided to establish a separate convention, with the necessary elements of harmonization as described above, and to set up a separate Union with a Secretariat which, "whilst maintaining its autonomy, could operate with [BIRPI], so that it could benefit of services that were already common to the two other Unions."[84] To this end it was provided in Article 25 of the UPOV Convention that the procedures for technical and administrative cooperation between UPOV and BIRPI would be governed by rules established by the Government of the Swiss Confederation in agreement with the Unions concerned.

Subsequent negotiations led to the present structure, in which the Director General of WIPO (the successor of BIRPI) is the Secretary-General of UPOV and is assisted by a Vice Secretary-General with a large degree of autonomy and a small number of collaborators. In the course of the 1978 revision, the status of UPOV, which, because of the large involvement of the Swiss Confederation as supervisory authority and of the extension to UPOV of certain arrangements made for BIRPI may have been somewhat uncertain, has been updated, and UPOV was endowed with all features of a modern international organization, in particular with legal personality and capacity.

A major role has been played in this by the current Secretary-General of UPOV, Dr. Arpad Bogsch. At this point the historical overview comes to a page which is still being written.

It remains to be said that UPOV counts currently 19 member States[85], a number which might seem modest in comparison with the 100 or so of the Paris Union for the Protection of Industrial Property, but which is quite comparable to the number of members of several special arrangements under the Paris Convention. UPOV member States also account for the largest part of the world seed trade.

In this part of the world, UPOV enjoys the confidence and enthusiasm of Hungary and Poland; it expects the adherence of Czechoslovakia in the very near future; it knows that countries like Bulgaria, Romania and the Soviet Union have already acknowledged many years ago the role of the protection of human ingenuity incorporated into new varieties in the development of agriculture and the well-being of mankind, a role which is now also acknowledged by international organizations, such as FAO and UNEP; it knows that those countries have a definite interest in the work of UPOV and consider accession to the UPOV Convention: your presence testifies to this.

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84 See in this respect, on page 70 of the Acts of 1957-1961; 1972, the report by Mr. J. Bustarret, President of the Committee of Experts. The Unions referred to are the Paris Union for the Protection of Industrial Property and the Berne Union for the Protection of Literary and Artistic Works.

85 Belgium, Denmark, France, Germany (Federal Republic of), Hungary, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Poland, South Africa, Spain, Sweden, Switzerland, United Kingdom, United States of America. Canada deposited its instrument of ratification on February 4, 1991 and will become the twentieth member State on March 4, 1991, on the opening day of the Diplomatic Conference to revise the UPOV Convention.

THE UPOV CONVENTION - THE SCOPE OF PROTECTION AND ITS GENERAL PROVISIONS

by

John Harvey, Controller, Plant Variety Rights Office, United Kingdom

1. Mr. Chairman, ladies and gentlemen. I am delighted to be back in Budapest for the second time this summer, and to have the opportunity to speak to you. I did not think, when I accepted this invitation, that I would see so many familiar friendly faces. The title of my subject is very wide-ranging, and I am going to disappoint all those of you who were expecting me to plough through all the Articles of the Convention in great detail. I am not. If I did, you would all miss lunch and probably the afternoon session as well. I am going to concentrate on what I consider are the most important provisions of the existing Convention, how and why they are changing in the new one, and, for what they are worth, give you my views on the current proposals.

2. However, before I begin to get into the detail of my subject, I want to remind you of what I have continually to remind myself. It is this. The legal and technical complexities of the Convention and DUS testing can very easily lead you into a minute examination of a text or a plant and obscure the strategy and intention of the Convention and of a plant breeder's right. I ask you now to remind yourselves during my talk of the rationale for the Convention in the excellent paper just given by Mr. Heitz. In my view, the Convention is not just a form of intellectual property protection specifically designed for plant varieties. In my own country at least it is the basis on which the research and development effort in plant breeding has been founded; the basis for the very significant developments in plant breeding in the last 30 years and the basis for United Kingdom trade in plant varieties. Without the Convention, I do not believe those developments would have taken place. We are not, therefore, talking about an abstract theoretical concept. We are talking about a Convention with real impact on research and development and world trade. That is what I want you to remind yourself of as I get into the detail of my subject.

3. I will start, then, with what is generally regarded as the crux of the Convention. It is in Article 5 of the present Convention, entitled "Rights Protected; Scope of Protection." Just to add to confusion, in the revised Convention (as it presently stands in document CAJ/27/2) it is in Article 14, entitled "Effects of the Breeder's Right." The revised article contains some of the more fundamental changes to the Convention and significantly--but perhaps not as much as the breeders would have liked it--strengthens the protection afforded to the breeder. Article 5 of the present Convention specifies the breeder's right as covering:

- the production for the purposes of commercial marketing;

- the offering for sale; and

- the marketing of reproductive or vegetative propagating material of the variety.

In other words, the rights are linked only to the sale or acts associated with the sale of the variety. Compared to patent law, for example, the plant variety right provides a weaker form of protection in that the holder of the right has no control over a whole range of acts associated with his variety. This applies particularly to the commercial reproduction on the farm.

4. There is growing concern within the plant breeding industry that with the impending introduction of biotechnological varieties bred using genetic manipulation techniques, for example to increase disease resistance or herbicide tolerance, there would be a greater incentive to bypassing the breeder's right and thus avoid the higher royalties that such varieties will undoubtedly merit. Another concern of farmers and plant breeders is the worldwide trend to reduce or eliminate farming subsidies. This will put pressure on farming incomes and increase the impetus of farmers to reduce their variable costs. This could well encourage greater use of home-saved seed and reduce further the royalty receipts which will fund the plant breeding effort of the future. The amendment proposed to Article 4 anticipates these events. It would allow the plant breeders to control such acts as:

- the reproduction or propagation of the variety or conditioning (i.e. cleaning and dressing) of the variety;

- the offering for sale, sale or marketing of the variety; and

- the export, import or the stocking of the material of the variety for any of these purposes.

5. This will give the breeder much more flexibility in the exercise of his right. Although he will not be able to collect royalties more than once on the same material, it does mean that he will be able to collect royalties on each reproduction of his protected variety, where at present he cannot. This is of course unless a member State derogates from the right in order to maintain what is loosely known as "farmer's privilege," a term which, incidentally, is not to be found in the Convention. I will return to that subject in a moment, but to keep in the same order as the current revision proposals I will deal first with two other provisions of Article 14, the extension of protection to end products and to essentially derived varieties.

Protection of End Products

6. The definition in the proposed Article 1 of the Convention of the word "material" covers not only reproductive or vegetative propagating material but also harvested material. For example, a holder of rights on a cereal variety will be able to collect his royalty on grain produced from his variety provided he has not collected it already on the seed itself. In most cases it will be simpler and more economic for him to collect it on the reproductive material, but he has that alternative. The question addressed in UPOV is whether the right should be extended further to allow royalties to be collected on what one might call transformed products - i.e. products directly obtained from harvested material. Examples of this may be cooking oil produced from a protected oilseed rape or sunflower variety, bread produced from a protected wheat or even perfume obtained from an exotic species.

7. There may be circumstances where it would be legitimate for the breeder to collect his royalties on such end products, for example where the product is being produced using his protected variety in a country without plant breeders' rights and where he cannot therefore obtain protection. However, UPOV has fought shy, rightly in my view, of giving such automatic protection. Certainly in the United Kingdom's view, such widespread power must be kept in reserve for special circumstances, and the revised Convention is likely to provide that contracting parties may extend the scope of protection to such

products. I would prefer some condition to be placed on such extension, but that is something to be further discussed. What does concern me is that if we go too far in strengthening the rights in this way we may encounter opposition to the basic principles of the revision and the Convention. I think we should be careful before we move away from protection of the plant variety to the protection of an industrial product obtained from a plant variety.

Essentially Derived Varieties

8. The concept of essential derivation is something entirely new. Under the present Convention the breeder's right covers only the variety he has bred himself. Any varieties bred from that, by whatever means, but usually by traditional cross-breeding, are entirely the property of the new breeder. Of course the timescale in traditional breeding is such that the breeder whose variety has been used in another breeding program has several years to commercialize and obtain benefit from his variety before the new derived variety is ready for market. But this could well change with the advent of biotechnology, and the possibility of genetic manipulation. The timescale for producing a new variety may be quite short. Furthermore a new variety may contain all the major components, for example yield and quality of the original variety, but confer a useful additional factor such as improved disease resistance.

9. A second area of concern is what one might call plagiarism or piracy, or simply the lucky discovery of chance mutation in a variety. In both cases it was felt that the owner of the original variety should not lose the value of his rights entirely, but that the breeder or discoverer of what will be known as the "essentially derived variety" must come to an agreement with the original breeder over the apportionment of royalty income. Relevant here, of course, is the definition of "essentially derived," and the wording of the definition, by referring to it being derived from a single protected variety, is intended to limit such dependency cases to specific circumstances where there is in effect only one parent variety. In the United Kingdom we would not wish to see an extension of this principle to traditional cross-breeding, which could in our view reduce the incentive for breeders to use the current best varieties in their breeding programs. This "research exemption" has, we feel, been one of the foundations of the continued improvements in plant varieties since the introduction of plant breeders' rights.

Farm-Saved Seed

10. The subject of farm-saved seed or "farmer's privilege" is so politically contentious that I am almost afraid to open my mouth. Certainly in the United Kingdom, in other EC countries and I am sure elsewhere, the, at times, conflicting views of the breeders, the seed trade and the farmers have all been made well known to the respective authorities in no uncertain terms. A particular problem is that the structure of the industry and the resulting farm-saved seed problem is different in different countries in both scope and degree. The position in Western Europe is totally different to that in such countries as the United States of America and Australia. It is even different within the European Community, not only in terms of the proportion of seed that is farm-saved, but also in terms of the arrangements for cleaning such seed (e.g. mainly through cooperatives in France and mobile seed cleaners in the United Kingdom). And I am only just beginning to learn of the position in Central Europe. I understand that in Hungary seed produced on the farm is closely

controlled, and I am not aware that farm-saved seed is considered a major problem. The issue, of course, is whether farmers should be entitled to produce seed to save from one year to another to produce a commercial crop without the breeder's agreement, or without the payment of any royalties. For the reasons I stated at the beginning of my paper, the fear, at least in some Western European countries, is that the growth in farm-saved seed may continue to the detriment of future investment in breeding programs. Moreover the biotechnology research effort which depends in part on a foreseen level of royalty income may be impaired if it results in seed of even greater value and an increased incentive to save it.

11. So UPOV, despite its cosmopolitan membership, has had to bite the bullet, recognizing, however, that, in framing a Convention, it is very difficult to decide that (a) everyone should do the same thing despite different circumstances and (b) everyone should do it in the same way. It has done so in the proposed Article 14(1) by extending the breeder's right over all commercial production (private use is still permitted), but in Article 14(3) to permit contracting parties to derogate from this to provide that farmers may use a protected variety on their own holdings to produce a new crop. However, very importantly, this will be subject to the provision that the interests of the breeder will not be unduly prejudiced, or a form of words to that effect. This will allow those member States who wish to continue to allow free use of farm-saved seed to do so whilst others may decide to carry the extension of protection into their own law.

12. The United Kingdom welcomes this flexibility. We have been and still are in discussion with all sectors of our own industry on this. Those of us in the EC will have to decide how we approach the question on a Community basis when the Commission publishes its proposals for an EC Plant Variety Right. None of this is easy but with goodwill on all sides I am sure we shall find an acceptable solution.

13. Perhaps I have dwelt long enough on the scope and effect of the breeder's right and should move on to cover one or two other important aspects of the Convention, trying not to cover points which may be made in other papers. In particular, I am very glad to see that someone else is dealing with the question of the interface between plant breeders' rights and other forms of intellectual property!

Field of Application of Convention

14. One of the important changes to the Convention is the extension of the field of application of the Convention to cover the whole plant kingdom. This is another strengthening of the Convention by encouraging contracting parties over a period of years to extend or at least offer protection in any species in which there is a demand for plant breeders' rights. This will overcome the present anomaly whereby species are protected in some member States and not in others. It will also increase the need for bilateral testing agreements and international cooperation in testing. If I am to offer protection in the United Kingdom for gum trees, yucca or even Hungarian grape varieties I will have a great deal of difficulty trying to grow them in Cambridge! But it is surely right that the plant breeder should be in the same position as any industrial inventor and be able to obtain protection for his new product provided it meets the criteria laid down. It will finally raise the question whether, for "minor species" the testing should be done by officials on the

premises of some authority or whether a higher contribution should be requested from the breeder. It is quite likely, for example, that the best reference collection will be with the breeder in some instances.

Right of Priority

15. I shall not dwell on the question of the right of priority. As you know, this is the provision whereby a breeder filing an application in one country can enjoy a right of priority in another UPOV country for up to 12 months. This is a useful facility where time is needed to evaluate a variety for production abroad. However it had under the existing Convention also allowed a further 4 years for the submission of plant material or supporting documents. This was unacceptably long. An authority could find itself in the position of having accepted an application and granted rights in one variety, only to find that an earlier application unsupported by documents or material had priority. If the varieties were not distinguishable the rights would then have to be withdrawn. In the revised Convention the 4-year-period has been reduced to 2 which should ease the problem.

Duration of the Breeder's Right

16. The revised Convention extends the minimum period of protection from 15 to 20 years for most species. Woody plants have a minimum of 25 years. It is surprising (or perhaps knowing UPOV meetings not so surprising) that long discussions have taken place about what are woody plants and what are not. You will recall my earlier warning about the detail of the Convention and the danger of getting so close to the trees that you failed to see the wood. Here is a classic example of what I mean. At one point in the discussion, the Chairman of the Administrative and Legal Committee produced a bunch of grapes in the meeting to make a point. He did not even offer them round! The precise duration of protection above the minimum is still for each contracting party to decide, but at least the minimum 20-year-period brings plant breeders' rights into line with the period of patent protection normally available.

Variety Denomination

17. The last matter I wish to discuss is variety denomination--the subject which over the years has probably taken up more time in UPOV than any others and which produces the strongest feelings. Certainly in the United Kingdom, we find the checking of variety names tedious and time consuming, if occasionally amusing. There is however a serious point. Some breeders feel that UPOV should not have an article on denomination at all. In the United Kingdom we feel that naming is important, and of particular importance is that a name should not confuse or mislead a prospective purchaser about the origin or qualities of a variety. We welcome the proposed new text of the Convention which should ensure that member States apply the naming criteria in a fair and reasonable way.

Summary

Mr. Chairman, the current UPOV Convention has served us well. I believe that out of the present discussions on the revision of the Convention will come a

stronger set of provisions designed to take UPOV and the plant breeders' rights system into the 21st century. I look forward to the completion of that process. I also look forward to an expanding membership of UPOV as the reality of the benefits of plant variety rights become better appreciated worldwide. And if that means greater international cooperation and the opportunity at some point in the future to return to Budapest, I shall be a very happy man.

DISCUSSION

1. Mr. Greengrass asked Mr. Harvey for more information on the situation in the United Kingdom regarding the "farmer's privilege," in particular the attitude of farmers.

2. Mr. Harvey first recalled that, in the United Kingdom, farm-saved seed amounted in the case of cereals to about 25% of the total seed used. Discussions had been initiated with four parties: the breeders; the farmers; the seed merchants; the seed cleaners using mobile equipment. Attempts have been made in the first place to eliminate the term "farmer's privilege," which did not appear in the Convention but had become widely used. The term was misleading: the farmer having a right to save his own seed was one thing, but the farmer having that right without obligation to pay a royalty was quite a different one. It was the view in the United Kingdom that the farmer should continue to have the right to save his own seed, if he chose to, and have it cleaned on his premises; but if he did so, some payment should be made to the breeder because he was using and processing the intellectual property created by the breeder in the first place.

3. There was a general acceptance of the fact that farm-saved seed was a problem and that something needed to be done about it. A practical solution to that problem was now being sought. It had to be practical because if seed cleaners were to be responsible for collecting a royalty on a farm and passing it on to the breeder, then that form of cooperation would clearly require an agreement on the problem that had been identified and on the solution to it. Failing such agreement one would create a system that would be rapidly circumvented. The solution was still being elaborated, but good progress had been made so far.

4. Mr. Johansson asked Mr. Harvey to elaborate on his remarks concerning the sharing of responsibilities in the testing of varieties between breeders and authorities.

5. Mr. Harvey replied that it was impossible to establish an official testing system for all species in all countries so that alternative testing methods had to be looked for. He saw no reason why, for smaller species, the testing should not be undertaken by the breeder on his own premises, provided that the reference collection was adequate, that the reference varieties were specified and the testing was undertaken with some official supervision. In this respect it should be kept in mind that the purpose of the plant variety protection system was to grant exlusive rights and that this implied a control of the operation of the system at the granting stage.

6. Mr. Urselmann referred to Mr. Harvey's personal opinion on the extension of the breeder's right to end products as given in paragraph 7 of his lecture. He felt that that opinion was in contradiction with the increasing trend for plant varieties to be just one element in a production system and consequently with the increasing need for protection extending to the product stage. He asked how breeders should safeguard their interests if protection did not go that far.

7. Mr. Harvey stated that he had two concerns. Firstly, if the point of collection of the royalties were extended to the end product as a rule, the Convention would move away from its roots, which was the protection of plant varieties and their reproductive material towards the other end of the production chain, namely the industrial products obtained from those varieties; and it could be contended that the plant breeders' rights system offered protection for a variety and its reproductive material, that the patent offered protection for the industrial product. He recognized, however, that there may be cases where unauthorized production--particularly in the vegetables and ornamental plants sectors--took place, where the breeder was unable to collect a royalty, and the question therefore arose whether he should be allowed, in those circumstances, to collect it further on down the production chain, including if necessary on the end product. In the current proposal for the revision of the Convention, provision was made to allow the collection of a royalty on that end product, provided that the breeder did not have an opportunity to collect it at an earlier stage.

8. Secondly, if the possibility was to be offered to collect royalties on end products in all cases, there would be a need to involve a whole range of further interested circles in the discussions, in particular the industrial manufacturers and the retailers. If one was not careful, they could become yet another limiting force in terms of the extension of the plant breeders' rights or even the legitimate extension of those rights. Mr. Harvey stated that he was very hesitant about creating that new force within UPOV, in particular when the current proposals for revision addressed the problems raised by Mr. Urselmann in an appropriate manner.

9. Dr. Porcelli asked Mr. Harvey for his opinion on the form of protection which should be contemplated for polyploids, somaclonal variants, transgenetic plants, etc.

10. Mr. Harvey noted that the question should be more appropriately addressed to his colleagues with a technical rather than administrative background. However, to the extent that it referred to biotechnology and sophisticated new breeding techniques, he felt that the processes involved were patentable subject matter. They should be patented if they met the relevant criteria, in particular the requirement for inventive step. The resultant varieties could still be the subject of plant breeders' rights, so one would have a variety protected by a breeder's right deriving from a patented process or incorporating a patented element. In his view this would create no incompatibility.

THE UPOV CONVENTION - THE CONCEPT OF VARIETY AND THE TECHNICAL CRITERIA OF DISTINCTNESS, UNIFORMITY AND STABILITY

by

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Introduction

The purpose of the UPOV Convention is to recognize and to ensure to the breeder of a plant variety a right under certain conditions.

The aim of this paper is to present some information about the concept of variety and the technical criteria for distinctness, uniformity and stability.

Variety Concept

Article 6 in the present text of the Convention defines the conditions of protection in general terms which require implementing rules capable of accommodating different elements which occur. Those implementing rules are set out in the General Introduction to the Guidelines for the Conduct of Tests for Distinctness, Uniformity and Stability of New Varieties of Plants.

From time to time it is necessary to make reference to a concept of variety which is broader than the concept of a "protectable variety." For instance, the distinctness criterion requires a comparison with "any other variety." Within this latter expression it is essential to include entities which are not necessarily protectable. In the same way, in relation to infringements, commercialized material which is different without being clearly distinguishable from the material of a protected variety must still be considered to be part of the variety.

In connection with the revision of the UPOV Convention, it is therefore proposed by different member States that a definition of a variety should be included.

The preliminary recommendation of a definition is "variety," a subdivision of a botanical species or of a taxon of a rank lower than species, whose subdivision, and the genotype which it expresses, are by reason of their characteristics regarded as an independent unit for the purposes of cultivation. Such a unit may be:

- a unit which is protectable under the provisions of the Convention, or
- a unit which is not so protectable in that it does not fully meet the conditions for distinctness, uniformity and stability.

Essentially Derived Variety

In practice the existing legal provisions concerned with the amount of distinctness or the minimum distance are called upon not only to make a technical determination that one variety is clearly distinguishable from another, but also to provide the basis for a valid judgment that a variety is sufficiently original to be assigned to a grant of Plant Breeders' Rights.

The distinctness criterion is not ideally adapted to decisions concerning the extent to which the variety of one breeder is excessively based upon the variety from another breeder.

The need to meet the situation where a new variety is derived from and deploys almost totally the genetic structure of an existing variety has been recognized and has resulted in the elaboration of the concept of essential derivation under which the breeder of a variety which is essentially derived from another variety is obligated in some manner to the breeder of the first variety.

Therefore the term "essentially derived variety" has been introduced and means a variety which satisfies the following conditions:

- it is predominantly derived from a single variety ("the initial variety") particularly through methods which have the effect of conserving the essential elements of the genotype of the initial variety, such as the selection of a natural or induced mutant or of a somaclonal variant, the selection of a variant, back-crossings or transformation by genetic engineering;

- it is clearly distinguishable from the initial variety in accordance with the requirements for distinctness, uniformity and stability; and

- it conforms to the genotype of the initial variety apart from the specific differences which result from the method of derivation used and differences which result incidentally from such method.

This definition specifies that the differences can be evidenced at the following levels:

1. at the level of the genome, for example by measuring the genetic distance by means of analysis of the Restriction Fragment Length Polymorphism (RFLP);

2. at the level of the genotype, for example by analyzing an electrophoregramme for a characteristic whose genetic control is known, or

3. at the level of the phenotype by simply noting the existence of a difference in a traditional growing test.

Technical Criteria for Distinctness, Uniformity and Stability

The technical criteria for the grant of Plant Breeders' Rights include:

Distinctness, Uniformity and Stability (DUS) which are judged on the basis of characteristics and their expressions.

Therefore the Convention provides that protection shall only be granted after examination of the variety. The prescribed examination should be adapted to the special requirements of each genus or species, and must of necessity take account of any special requirements for growing the plants.

To give guidance on this adaption, "Test Guidelines" are published for the Conduct of Tests for Distinctness, Uniformity and Stability of new Varieties of Plants.

With these Test Guidelines member States have a common basis for testing varieties and establishing variety descriptions in a standardized form which facilitates international cooperation in examination between their authorities.

The Test Guidelines are also helpful to applicants for the grant of rights by giving them information on the characteristics to be studied and on the questions which they will be asked about their varieties.

Before discussing the technical criteria for Distinctness, Uniformity and Stability, it seems to be appropriate to give some information on the use of different characteristics and statistical methods in connection with the DUS testing of varieties.

The Use of Characteristics

The characteristics used to distinguish varieties may be either qualitative or quantitative.

Qualitative characteristics are those which show discrete discontinuous states with no arbitrary limit on the number of states.

Quantitative characteristics are those which are measurable on a one dimensional scale and show continuous variation from one extreme to the other. They are divided into a number of states for the purpose of description.

Characteristics which are assessed separately may subsequently be combined, for example the length/width ratio. Combined characteristics have to be treated in the same way as other characteristics.

In order to obtain comparable results in the various member States the scope of the test has to be fixed.

Qualitative characteristics are normally recorded visually, whereas quantitative characteristics can be measured.

Both qualitative and quantitative characteristics may be to a greater or lesser extent subject to environmental influence which may modify the expression of genetically controlled differences. The characteristics least influenced by environment are therefore preferred.

The characteristics listed in the Test Guidelines are those which are considered to be important for distinguishing one variety from another and which are therefore also important for the examination of uniformity and stability.

It may not always be necessary to use all the characteristics listed in the individual Test Guidelines to identify and describe a variety. To harmonize descriptions issued by the member States, certain characteristics have been marked with an asterisk (*) to show that they should be used every growing period for the examination of all varieties and should always be included in

the description of the variety, except when the state of expression of a preceding characteristic renders this impossible.

Characteristics which are not so marked have to be recorded if they are necessary to distinguish a candidate variety from another variety. Additional characteristics may be used by the examining authority if they are considered useful or necessary. Some member States accept a large number of characteristics for the testing of distinctness which means that the breeder has to make his variety uniform for all those characteristics, while other member States accept a much smaller number of characteristics, which, however, makes it more difficult to distinguish a candidate variety within the limited number of characteristics.

Long lists of characteristics are accepted mainly in order to avoid rejection of a candidate variety which is of good economic value because of lack of distinctness due to the small number of listed characteristics, while a reduced list of characteristics is adopted mainly to avoid an unnecessary workload on the testing authority and to reduce the characteristics to those sufficient to distinguish the majority of varieties.

To enable varieties to be tested and a variety description to be established, characteristics are subdivided into their different states of expression, called "states," and the wording of each state is followed by a "note."

For a better definition of the states of a characteristic in the Test Guidelines, example varieties are indicated whenever possible.

Example varieties are used as a help. The testing would become too difficult if an example variety had to be used for each characteristic and for each state. Out of the example varieties indicated in the Test Guidelines the national authorities can choose the ones which they consider most appropriate for the solution of a given problem.

The Use of Statistical Methods

Statistical tests are generally considered as a very important tool for establishing of Distinctness, Uniformity and Stability of candidate varieties.

Nevertheless, the application of statistical methods is restricted to some relatively simple techniques for a specific type of characteristics in a limited number of species.

1. DUS testing differs between the types of species.

- For ornamentals, the testing period hardly exceeds one year. Candidate varieties are basically determined on comparison with descriptions of already existing varieties for the judgment of distinctness and uniformity. The number of reference varieties is rather high and may change from year to year.

- For vegetables, the situation is different. Grouping characteristics play an important role. The high number of reference varieties and the limited space available leads to a system of comparison of candidate varieties with one or more "close controls" within each group. The set of reference varieties in trial may change from year to year, although to a lesser extent than ornamentals.

- For agricultural crops, the situation is much clearer. For a number of species, the assessment of measured characteristics is necessary, e.g. potatoes and cereals, whereas testing in other species is impossible without measurements, e.g. grasses.

2. Most characteristics are assessed by visual observations. For a good visual comparison, it is often required to have varieties side by side in the trial. Such a trial layout often violates the randomization requirements for a statistical analysis.

Distinctness

The variety must be clearly distinguishable by one or more important characteristics from any other variety whose existence is a matter of common knowledge at the time when protection is applied for.

The term "important" in this context means important for the purpose of establishing distinctness, and does not refer to economic or practical value of the characteristic.

Common knowledge may be established by reference to various factors such as: cultivation or marketing already in progress, entry in an official register of varieties already made or in course of being made, inclusion in a reference collection, or a precise description in a publication.

The first basis for comparison is normally those varieties which are considered to be similar to the candidate variety and are available in the examining member State.

For identification of a "similar" variety, the member States are using different methods. These methods can also vary from species to species depending on whether the data is coming from qualitative or quantitative characteristics.

The characteristics which permit the variety to be defined and distinguished must be capable of precise recognition and description.

A candidate variety is considered to be distinct from comparable varieties if the difference has been determined at least in one testing place--is clear--and is consistent.

In the case of qualitative characteristics, the difference between two varieties has to be considered clear if the respective characteristics show expressions which fall into two different states. When distinctness depends on measured characteristics, the difference has to be considered clear if it occurs with one per cent probability of an error, for example, on the basis of the method of Least Significant Difference (LSD). The differences are consistent if they occur with the same sign in 2 consecutive, or in 2 out of 3 growing seasons.

The 2 x 1 per cent rule has been used for some time as a measure of minimum distance. The weakness of this method is that a within-year difference which just fails to achieve the 1 per cent level contributes no more to the separation of a variety pair than zero difference or even a non-significant difference of the opposite sign. For example, 3 differences in the same

direction, one of which is significant at the 1 per cent level and the others at the 5 per cent level, would not be regarded as sufficient evidence for distinctness.

Therefore the t-score method was introduced to overcome this weakness. Using t-scores, two varieties are distinct if the absolute sum of their t-scores over 3 years exceeds the critical value 5.2, which is equivalent to twice the tabulated t-value at the 1 per cent significance level with a large number of degrees of freedom.

Although these criteria include requirement for repeatability over years, they are based on the plot error mean square and therefore do not take into account variety variation over years. Since variety measurements are less consistent on some characteristics over years than on others, the use of these criteria result in acceptance standards varying between characteristics.

The recommendation to adopt the Combined Over-Years (COY) criterion which measures variety differences against variation in differences over years meets the above criticism.

The COY criterion provides a check on the reproductibility of variety differences over years, it uses all the available information and the risk of making incorrect decisions is constant for each characteristic.

Uniformity

The variety must be sufficiently uniform, having regard to the particular features of its vegetative propagation or sexual reproduction.

To be considered uniform, the variation shown by a variety, depending on the breeding system of that variety and off-types (off-types mean plants which differ in their expression from that of the variety) due to occasional mixture, mutation or other causes, must be as limited as necessary to permit accurate description and assessment of distinctness and to ensure stability.

This requires a certain fixed tolerance which will differ according to the reproductive system of the variety--vegetatively propagated, self-pollinated or cross-pollinated. For vegetatively propagated and self-pollinated varieties, a table has been established which indicates the maximum acceptable number of off-types in samples of various sizes.

In some cases of vegetatively propagated varieties, and in particular for species having a rather weak genetic structure, lack of uniformity is often observed on one and the same plant rather than between different plants.

Cross-pollinated varieties normally exhibit wider variations within the variety than vegetatively propagated or self-pollinated varieties and it is sometimes difficult to distinguish off-types. Therefore no fixed tolerance can be determined, but relative tolerance limits are used through comparison with comparable varieties already known. This means that a candidate variety is considered to be sufficiently uniform with respect to a defined character if the spread of its individual plant measurements are not excessive when compared with previously accepted varieties.

In statistical terms, this is interpreted in the way that the standard deviation of a candidate variety should not significantly exceed that of comparable reference varieties.

Stability

The variety must be stable in its essential characteristics, that is to say, it must remain true to its description after repeated propagation or reproduction or, where the breeder has defined a particular cycle of multiplication or reproduction, at the end of each cycle.

It is not generally possible during a period of 2 to 3 years to perform a test on stability which leads to the same certainty as the testing of distinctness and uniformity.

As far as necessary, stability has to be tested by growing a further generation or a new seed stock to verify that the variety exhibits the same characteristics as those shown by the previous material supplied.

Generally, when a submitted sample is found to be uniform, the material is also considered to be stable.

As long as member States do not all examine the same characteristics, or even leave the examination to the breeder, varieties accepted by one member State will continue to run the risk of rejection by another member State due to lack of uniformity or stability for characteristics not tested by the other member States.

Conclusion

As a result of the rapid development of new technology in breeding methods to create new varieties they seem likely to be closer to each other in the different characteristics. Therefore UPOV experts have to be closely acquainted with all new and different factors which will play an important role in the performance of the tests for Distinctness, Uniformity and Stability for the grant of Plant Breeders' Rights in the future.

THE UPOV APPROACH TO THE EXAMINATION OF APPLICATIONS FOR PROTECTION - PAST, PRESENT AND FUTURE

by

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Introduction

Before UPOV was founded and before it took up its work, many countries had, of course, their own regulations concerning variety protection. The procedure of technical examination was different in the general philosophy and in the technical details. Especially for the "old" species, such as wheat or pea, for which the different countries had a long tradition in examination, the approach was quite different from country to country. Often there was no written concept of the testing procedure and of the technical requirements available. The national expert responsible for the examination of a species or a group of species was the only source of the know-how in this respect and it was up to him to decide upon the whole procedure. So a breeder working with different species might have experienced quite different conditions for the protection of his varieties in his own country. The situation was even worse when he tried to file his varieties in several countries for protection. So in the course of international orientation of breeding work there was a need for harmonization of examination procedures. Moreover the breeders became conscious of their rights and were no longer ready to accept any decision which the national authority may have taken without clear rules.

UPOV Technical Guidelines

The first thing that UPOV had to initiate therefore was to set up guidelines for the examination of application for protection. Technical Working Parties were installed who had--and still have--the main task to prepare technical guidelines for the conduct of tests with the individual species. This work started in 1970. The guidelines are meant to give recommendations for the national authorities of which characteristics are suited for the test and in which way they should be observed. They are also meant to be a guiding principle for the breeders. At present there are more than 120 of such UPOV Technical Guidelines available, from African Violet, Barley and Carnation over Lemon, Lettuce and Maize to Vine, White cabbage and Willow. Further new guidelines are in preparation. In the same time the revision of existing guidelines is pursued, as experience and development in the respective species require an updating from time to time. All this preparatory work is done in the framework of the "General Introduction to the Guidelines," a UPOV document which has been dealt with before.

In order not to set up one-sided rules, the breeders have always the opportunity to comment on the drafts of the guidelines before they are adopted. In many cases the international professional organizations are invited to send experts to the meetings of the Technical Working Parties or Subgroups and to contribute to the preparation of the specific guidelines. If necessary, scientific bodies are also consulted. This system works quite well and produces good tools for the variety examination which are accepted not only within UPOV for variety protection but also by other bodies such as the EC for national listing and seed certification.

Harmonization of Administrative Procedures

Technical guidelines and a harmonized system of interpretation of the test results are a necessary basis for the procedures in the different countries. For the breeder it is very awkward if he has to face quite different administrative requirements including fees in the individual countries where he wants to get variety protection. Therefore an important task for UPOV was to harmonize also the administrative requirements. So application forms including technical questionnaires for the different crops were prepared, as well as models for technical reports including descriptions and recommendations for testing fees.

International Division of Labor

The growing tests are generally performed over two periods of vegetation. For the purposes of comparison, live collections of a great number of plant varieties have to be maintained. Both are expensive. A recommendation was therefore added to the Convention, requesting member States to make available their testing facilities--that means in practice their growing fields, glasshouses and laboratories--for the examination of varieties filed in other member States.

The majority of the present member States of UPOV have already followed this recommendation for numerous species of plants. For instance varieties of pears and sunflowers are tested in France, apples and chrysanthemums in the United Kingdom, carnations and freesias in the Netherlands, clovers and junipers in Denmark, rye and pelargoniums in the Federal Republic of Germany.

Such cooperation is only possible where the examining bodies of the different countries have considerable confidence in each other. Breeders must also have confidence in the neutrality of examinations in another member State. In order to provide a legal guarantee, the Council of UPOV adopted in 1976 a model for an administrative agreement for bilateral cooperation in the field of technical examination. On the basis of this model agreement the UPOV member States have concluded bilateral agreements with each other.

Centralized Examination

For quite a lot of species, especially ornamental species, the different countries were in the position to provide variety protection only on the basis of such a division of labor. For the breeder this means that for an application in several countries he has to pay only one testing fee and a reduced fee for the other countries which take over the test results. Moreover this system provides the optimal situation that the basis of the decisions on distinctness, homogeneity and stability of a variety in the different countries is the same. The decision which is taken under national responsibility will usually be the same. In contrast, a variety examined in several countries may obtain different results, even if the technical guideline was the same.

This system of cooperation in which one country does the variety examination for one or more other countries, comprises at present about 250 species. However there are quite a number of species, mainly agricultural and vegetable species, for which this kind of centralized tests could not be reached yet. The reasons are various. Partly there are different types of varieties from

country to country with only limited overlapping. Other reasons are the specific importance of the respective species in several countries and their wish not to lose technical expertise for this species.

Alternative to Centralized Examination

As a compromise several countries have agreed to continue testing such species themselves, but to take over each others results in cases where a variety is filed in more than one country. For this type of cooperation the UPOV model agreement was amended respectively. At present five countries (Denmark, France, Federal Republic of Germany, Netherlands and United Kingdom) make use of this version. It covers mainly about twenty species each of agricultural and vegetable crops, such as wheat, different grasses, cabbages and lettuce.

The benefit of this is on the breeder's side as there is only one testing fee and one test result for faster decisions in several countries. For the authorities there is hardly any advantage. The countries taking over the results have to incorporate the variety in their own reference collection and to produce their own results after the decision. Their income from fees for examination is nevertheless decreasing.

Moreover there is a certain risk that, after the decision has been taken, the variety is found to be not distinct in the collection of the country which has taken over the results. In such a case the variety protection would have to be cancelled. Indeed, no case has occurred so far where such a step would have been necessary.

Nevertheless the countries concerned are aware of the constraints of this type of cooperation. Therefore they are trying to reach agreement on centralized tests for more and more of these species. These efforts fit well into the plans of the European Commission to provide a plant variety protection for the European Community.

Activities in Cooperation

To give a rough figure of the activities in cooperation: more than 11,000 test results have been requested by member States from other member States. This fact expressed in my mind a really great thing, maybe a world novelty: the standardization worldwide of the notion of variety and of variety examination.

Making Use of Breeders' Facilities

The UPOV Convention does not exclude the possibility of using examination results obtained by the breeder and on the breeder's premises. The only condition is that these examinations follow the technical principles laid down within UPOV.

There are two projects in this respect. One is the system followed in the United States of America, where the breeder has to present test results which are elaborated on the basis of the respective UPOV-Technical Guidelines.

Other UPOV countries follow a slightly different system. These are countries which are extending their list of species eligible for variety protection to more and more plant species. The list of my country comprises for instance 160 botanical families, which means practically the whole kingdom of plants. It is quite obvious that no examination authority can provide testing facilities for all species from which applications for protection may be presented. So, for new species for which only few applications can be expected, the examination authorities make use of the breeder's facilities. The breeder has to do the test on his premises according to the specification of the authority. If necessary reference material from botanical gardens or from other institutions holding comparable material has to be included. For this purpose the breeder has to give relevant details in the Technical Questionnaire. The observations on the plants in the breeder's premises are done by the authority.

In this case and in general, detailed and reliable indications in the Technical Questionnaire can help to find the right comparisons in the distinctness and homogeneity test to get quick results.

Making Use of more Sophisticated Methods

The morphological characteristics commonly used for examination have the disadvantage that most of them are more or less susceptible to environmental conditions. So the examination takes for a lot of species a rather long time --at least two growing periods. Moreover the discriminative power is limited. So new types of characteristics were looked for, which could improve the situation. Since more sophisticated methods such as electrophoresis, gas chromatography, analysis of colors, offer such a potential, their possible use has been discussed for quite a few years. For instance the different protein structures which can be revealed by the electrophoresis technique do indeed offer quite a lot of possibilities for variety distinction. They are usually independent of environmental conditions and can be assessed rather quickly. In spite of these prospects there is an agreement within UPOV that such a sophisticated method as electrophoresis should not be taken for establishing variety protection until all implications have been discussed and clarified. As there is usually no correlation between protein bands and the morphological characteristics, there was some doubt whether the breeder would be able to keep his variety homogeneous and stable in terms of protein characters. Moreover there were fears that the discriminative power of such characteristics would lead to very small distances between varieties and thus to an erosion of plant variety protection.

These questions are discussed and scrutinized very carefully within UPOV, amongst the officials of the member countries as well as with the breeders' organizations, on national as well as on international level. This tool, protein-electrophoresis, is in the meantime widely used for identification purposes in seed certification and commerce and breeders partly make use of it in their breeding programs.

Incorporation of Electrophoresis

With a view to possible incorporation of more sophisticated methods, such as electrophoresis in the variety examination, certain criteria will have to be taken into consideration:

- A protein band or group of protein bands can be used just like a morphological characteristic, it is bound to a specific gene locus.

- It should be handled according to the same principle as other characteristics are handled. So it has to fulfill the same conditions.

- Only a clear absence or presence of bands should be accepted. Only electrophoresis procedures which enable this kind of assessment should be used.

- All protein bands taken should be defined by molecular parameters such as molecular weight, isoelectric point or relative electrophoresis mobility.

- As far as possible, those protein bands should be taken which indicate a character relevant for the use of the variety.

After adequate workshops and discussions with breeders, scientists and users of varieties, it was decided within UPOV to make a start with self-pollinated cereals. So, on the occasion of the revision of the UPOV-Technical Guidelines for Wheat, Barley and Oats, protein electrophoresis will be taken up as one part of the set of characteristics recommended for each of these species. The work for the establishment of these guidelines is in progress.

Only when such more sophisticated methods and the characteristics revealed by them are integrated in the registration procedure can they be reliably used in certification or in commerce.

New Definition of Variety

In the light of increasing knowledge and possibilities of genetic engineering, it might be necessary to discuss a new definition of the term "variety." It might no longer be sufficient to define a variety by a set of about 25 morphological characteristics. It would rather be necessary to define it by its whole genome, represented in the standard sample of the variety. Of course it would not be possible to check all genes. It would not even be sensible to try to do so, as the majority of the genes do not have any link to the important features of a variety. So, again, the variety tests and identity checks would have to be restricted to a manageable set of characteristics--morphological characteristics, protein bands or others--for routine testing. These might be extended in particular cases to characteristics which indicate a certain feature for the use of the variety. These could be certain protein bands which are known to be linked to a feature, like a certain quality, resistance to a disease, etc. It will be desirable to know as much as possible about the links between protein bands and specific features. The same is true for DNA sequences revealed by RFLP which, no doubt, will have to be taken into consideration in future for specific cases. A common understanding should be reached within UPOV about the use of such genetic fingerprints.

Conclusion

At the beginning of my paper I have described the technical development of UPOV in the last twenty years. With the new development in breeding with the help of new sophisticated methods of genetic engineering, UPOV will have

to face quite new things and to set far-reaching aims. This will certainly be a task for a further twenty years, with variety examiners in close contact with scientists and breeders. We must above all ensure that new methods of examination do not hamper breeding progress.

DISCUSSION

1. Mr. Urselmann noted that Dr. Fuchs had referred in his lecture to the use of new methods for the assessment of varietal characteristics in relation to protection and registration of varieties, for instance to the value of gene mapping when a gene was correlated to an important feature. Mrs. Rasmussen had also mentioned the extension of the list of characteristics to avoid rejection of a variety with a good economic value. He wondered whether this indicated that a move within the Technical Committee of UPOV towards the use of characteristics involved in the economic value or of the variety or its importance for use.

2. Dr. Fuchs recalled that the first goal of DUS testing identified more than thirty years ago was to describe the varieties as precisely as possible and to make them recognizable on the basis of the description. The tools for this were initially the morphological characteristics, which usually had no or little relation to merit in terms of yield or quality. Those characteristics had been chosen for their stability under varying environmental conditions, which made them easy to describe and facilitated the identification of the varieties. Yield characteristics and other features relevant for the use of a variety were not suitable for those purposes. But, if new tools were available in future which permitted to examine characteristics combining both aspects, that is, characteristics that were not influenced by environment and gave an indication on the value of the variety, there was no doubt that those characteristics would be the optimal ones and would be used.

S E C O N D S E S S I O N

THE INTERFACE BETWEEN PLANT BREEDERS' RIGHTS AND OTHER FORMS OF INTELLECTUAL PROPERTY PROTECTION; THE EXPERIENCE OF A MEMBER STATE OF UPOV

Chairman: Jenö Bobrovszky, Head, Legal and International Department, National Office of Inventions, Hungary

THE INTERFACE BETWEEN PLANT BREEDERS' RIGHTS AND OTHER FORMS OF INTELLECTUAL PROPERTY PROTECTION AND THE FUTURE

by

Barry Greengrass, Vice Secretary-General, UPOV

I have the task of describing and discussing very briefly the interface between patent protection and plant variety protection and the future. In order to do this I will remind you very briefly of some of the principle features of these two forms of protection and of the historical background to their relationship. Patents are granted for the protection of inventions. In order that a patent may be granted for an invention it must:

(i) be industrially applicable,

(ii) be novel,

(iii) be the subject of an enabling disclosure (this means that it must be so described in the patent application that a person skilled in the art to which the patent application relates can, by following the description of the invention, reproduce or repeat the invention), and

(iv) represent an inventive step in relation to the existing state of the art (this means that the invention disclosed in the patent application should not constitute an obvious step forward from the existing known technology to a person with average skill completely informed about the technology which is in the public domain at the date of the application).

Once a patent is granted its effect is to enable the patentee to exclude others from working the invention, this is to say, from performing acts such as making, using or selling a product or applying a process which falls within the claims of the patent. The claims in effect define the protection sought by the patentee.

In many countries plant varieties were considered not to fulfill one or other of the criteria mentioned above and thus to be ineligible for patent protection. In some countries, patents were occasionally granted that included plant varieties within their scope of protection, but the practice was controversial and the validity of some such patents was in doubt. Amongst the reasons for doubt concerning the eligibility of plant varieties for patent protection were:

(i) the absence of an enabling disclosure (it was suggested that it was never possible to so describe the process of selection of a specific variety that a person skilled in the art could repeat the selection of the same variety);

(ii) that living material was not appropriate subject matter for the patent system or that exclusive rights should not be granted in relation to plant varieties constituting an essential step in the food production process;

(iii) that the process of selection of a plant variety addressed an obvious objective with known technology and did not represent an inventive step.

It was also suggested that since plant varieties are frequently capable of self replication, a patentee's rights would be exhausted after the first sale and would not extend to subsequent replication, so that a patent was an ineffective form of protection for a plant variety.

The precise position differed from country to country depending on its patent law and on its patent practice and jurisprudence. For present purposes it suffices to say that, in the years prior to 1960, the likelihood of securing effective patent protection for a plant variety was not generally considered to be sufficient to provide an effective incentive for investment in plant breeding.

The International Convention for the Protection of New Varieties of Plants of 1961 (the "UPOV Convention") resulted from pressure from interested circles arising from this perceived lack of effective protection for plant varieties and the desire of governments to provide effective incentives for this socially beneficial activity. However, the protection provided for in the UPOV Convention was very specifically tailored to the needs of the agricultural and horticultural industries and to what were considered to be the needs of the community and its food supply. The first two paragraphs of the Preamble to the UPOV Convention read as follows:

> "Convinced of the importance attached to the protection of new varieties of plants not only for the development of agriculture in their territory but also for safeguarding the interests of breeders.
>
> Conscious of the special problems arising from the recognition and protection of the right of the creator in this field and particularly of the limitations that the requirements of the public interest may impose on the free exercise of such a right."

Whilst under the patent system the available scope of protection is limited only by the valid claims of the granted patent, under the UPOV Convention the scope of protection is limited to the variety, the specific assemblage of plant material selected by the breeder which represents the variety, in relation to which the breeder is granted the specific rights specified in the Convention. Thus the breeder's right, with one exception relating to cut flowers, is the right to produce for the purposes of commercial marketing and to market the reproductive or vegetative propagating material of the variety. The breeder's right does not extend to the end product of the variety, for example to the fruit or the grain, and seed, for example, which is produced by a grower on his holding for use on that holding is not produced "for the purposes of commercial marketing" and thus falls outside the protection.

Protection of this specifically defined nature was deemed by the signatory States of the 1961 Act of the Convention to be appropriate in the circumstances of the plant breeding and agricultural industries. The Convention does provide for the possibility for countries, optionally, to increase the scope of protection even as far as the end product, but few countries have done so.

The interface between patent protection and protection under the UPOV Convention was addressed by Article 2(1) of the Convention which provides as follows:

> "Each member State of the Union may recognise the right of the breeder provided for in this Convention by the grant either of a special title of protection or of a patent. Nevertheless, a member State of the Union whose national law admits of protection under both these forms may provide only one of them for one and the same botanical genus or species".

The last sentence of Article 2(1) has been interpreted by the practice of UPOV member States to mean that patents should not be granted for species for which plant breeders' rights are available. Thus both France and the Federal Republic of Germany, which prior to the enactment of laws relating to plant breeders' rights did grant some patents relating to plant varieties, continued to be prepared to grant patents for species for which plant breeders' rights were available but ceased to grant patents for species protected by the new form of protection. This interpretation was also reflected in Article 53(b) of the European Patent Convention which excludes plant and animal varieties from protection by patent and in similar exclusions in the national laws of some forty-two States.

Over the same period, the 1950's and 1960's, as that within which the emerging plant breeders' rights system was developed, the patent system was contending with the problem arising from the necessity to protect micro-organisms, another form of living material, where similar difficulty in providing an enabling disclosure or description of the invention confronted the patent applicant. The patent system overcame this difficulty in relation to micro-organisms by the introduction of a system of deposit. The patent applicant must still describe his invention fully but insofar as the description is inadequate to enable a skilled person to repeat the invention, the inadequacy is remedied by a public deposit of the organism itself. The deposit and description together are deemed to constitute an enabling disclosure. The system of deposit thus potentially overcomes one of the historical problems that impeded the protection of living material, including plant varieties, by patent. An international treaty, the Budapest Treaty of April 28, 1977, on the International Recognition of the Deposit of Micro-organisms for the Purposes of Patent Procedure now regulates the mutual recognition of deposits by States which are party to the Treaty.

The next major development influencing the interface arose not within the system of industrial property protection but within the realm of the biological sciences. The discovery of the structure of the DNA molecule, the chemical substance that constitutes the nucleus of the cell and contain the vast majority of the genetic information which is the major basis for inheritance, opened up a vast new field for innovation and invention. The fact that the genetic code was common to all living matter meant that traditional distinctions between macro and micro-organism were of limited usefulness. Most importantly it has begun to be possible to describe living organism in terms of the chemical units which constitute their genotype instead of relying upon the less reliable attributes of the phenotype. Significant investments have been made and are being made in the new arts of molecular genetics and tissue culture. Questions accordingly arose concerning the form of industrial property protection available for inventions in the field of biotechnology. A vigorous international debate began which continues at the present time and has been reflected in the activities of both UPOV and the World Intellectual Property Organization ("WIPO").

So what were the issues that arose? Well, as far as plants were concerned, people involved in biotechnology looked at the forms of protection that were available for plants. They were investing money in this field, the point at which they could finally earn a return was the commercialization of a plant variety and so they came to look at the UPOV Convention and frequently they would have been people with a patent background and accordingly they compared the UPOV Convention with the patent system. Of course they found significant differences. UPOV protection is limited to the reproductive material, it

affords a farmer's privilege and it is limited to the variety. You cannot make claims so as to stake out a bigger area of monopoly for yourself. You cannot claim a characteristic. I think this is very important for plant breeders. If you have a variety which expresses a particular characteristic, you may own the variety but you do not own and cannot claim any exclusive right to the particular characteristic, even if it is a rather new characteristic. So they felt rather unhappy about what they saw. Much material has been published, there has been much debate on this subject. But, of course, insofar as the UPOV form of protection is more limited than patent protection, it is limited for very specific reasons. You will recall my reading the Preamble to the 1961 Act of the Convention where the fathers of the Convention, the people who were involved in that drafting and creative process, felt that it would be wrong to grant protection that went too far. It would be wrong for a farmer not to be able to produce a certain amount of his own seed on his own farm. This is a fundamental aspect of the interface. The fact that the policy of the plant breeders' rights legislation is plainly different from the policy of the patent laws, but this was not an accident. It was a deliberate act of policy on the part of the countries that were involved. If there are to be changes then making the changes will equally be a political act of countries involving their agriculture industry interface. Countries and their governments must address these questions and decide whether or not the particular aspect of the interface is something that they will change. The breeders' rights scope of protection is not intrinsically limited, we are already hoping that we will be able to increase the scope of protection under a revised UPOV Convention but it is for governments to decide how far they wish the plant breeder's protection to extend. This accordingly is the first largely political aspect of the interface.

A second major aspect of the interface concerns the situation where the scope of a patent for a biotechnological invention is such that it embraces a protected plant variety. A simple example of this would be a patented gene which is incorporated into a protected plant variety. Perhaps the claims of the patent for the gene are such that it embraces, it covers, any plant variety that contains that gene. It is very easy to talk about a patented gene and we tend to do it fairly frequently nowadays. Exactly what it means to patent a gene and what the scope of the claims for a gene will be, largely remains to be seen. I think most people anticipate that the scope of patents covering some genes will be sufficiently broad to cover plants and perhaps plant varieties, but it is by no means clear. It is a very, very grey area, but it is useful for us, in order to try and clarify our thinking, to talk about patented genes, although it is not really quite such a simple concept in practice.

Most plant breeders, at this conceptual level, seem to be fairly happy with the notion of a patented gene. Most plant breeders are happy with the notion that if somebody has managed to patent an invention involving a gene and its claims cover his plant variety, he should not be free to exploit his plant variety without the permission of the patentee. I think someone will correct me if that is not a generally held view nowadays, but it is my impression that this view is accepted in breeding circles.

Another obvious example of interface where the scope of a patent covers a plant variety, arises if a patent is granted which claims a plant, as opposed to a plant variety. The notion is abroad in patent circles, that there are things called plants which are not plant varieties and one can imagine circumstances in which that may be true, but one has to look very carefully at any claim for a plant to make sure it is not actually a plant variety. It is clear

that if a patent claims a plant, some of the claims relating to that plant might be sufficiently broad to cover a particular plant variety. When for example in a country where patents are granted for plant varieties, for example in the United States of America, it is possible that the claims relating to one variety might be so broad that they cover a whole class of varieties. I can give you an example. A patent was granted for a variety with a high content of a particular oil constituent in sunflower. If that patent had retained its validity, then it would have been very difficult for anybody else to have bred sunflower varieties with that particular oil constituent. This is a further example of interface between the patent system and plant variety protection system.

Another problem area arises if patents are granted in some countries for plant varieties. The patent applications and the variety descriptions become part of the public record. You will recall that the criteria for granting patents are novelty, industrial applicability, an enabling disclosure and inventive step. The criteria for granting plant variety protection are distinctness, uniformity and stability. If patents are granted for inventions that are in fact plant varieties without the application of the UPOV criteria, then the existence of these varieties will not necessarily be known to the plant variety protection Offices. When decisions are made about distinctness, what account should be taken of patented plant varieties whose uniformity, stability or, distinctness in UPOV term, are unknow? This is a significant ongoing problem for the plant variety protection system.

The question of the protection of innovations in the field of plants has been examined by both UPOV and WIPO. In 1983, WIPO was entrusted with undertaking a study on the industrial property protection of biotechnological inventions, it being understood that this term would include inventions in the field of plants. That study was carried out in four sessions of the WIPO Committee of Experts on Biotechnological Inventions and Industrial Property (hereinafter referred to as the "WIPO Committee of Experts"). In 1987, the Council of UPOV entrusted the UPOV Administrative and Legal Committee with the task of preparing proposals for the revision of the UPOV Convention whose revision raises questions relating to the protection of biotechnological inventions. The Committee has held six sessions for this purpose.

In October 1988, the UPOV Council and the WIPO Committee of Experts agreed that the question of the interface between patent protection and plant breeders' rights should be studied jointly by the two organizations. As a first step, the Office of UPOV, in cooperation with the International Bureau of WIPO, prepared in April 1989 a draft memorandum on the interface between patent protection and plant breeders' rights (document CAJ/XXIV/4), which was submitted for comment to the UPOV member States, to several other States and to the European Patent Office. Both the said document and the comments received can be obtained from either the International Bureau of WIPO or the Office of UPOV. A summary of the comments is contained in document WIPO/UPOV/CE/I/3.

In September/October 1989, the General Assembly of WIPO and the Assembly of the International Union for the Protection of Industrial Property (Paris Union), as well as the Council of UPOV, approved the proposal to hold a meeting jointly organized by the two organizations to examine the question of the interface between patent protection and plant breeders' rights.

What was meant by the expression "interface" which has been adopted in the decisions referred to above is the whole relationship between the two forms of

protection, the extent to which they meet, conflict, overlap or present gaps in protection.

A meeting of a Committee of Experts jointly organized by WIPO and UPOV pursuant to this proposal was duly held in Geneva from January 29 to February 2, 1990. Delegates addressed a series of questions set out in document WIPO/UPOV/CE/I/2 [copies of which are available to you]. The issues are complex and the questions are numerous. We cannot consider them all in the time available to us in this Seminar. The Report of the meeting is available in document WIPO/UPOV/CE/I/4 if you wish to study the subject in more detail. The questions discussed included the justification for exclusion from patent protection, the so-called farmer's privilege and breeder's exemption under the UPOV Convention, inventive step, the patenting of plant characteristics as features of patented invention, the protection of plant varieties as products of a patented process, the definition of plant variety and the mutual dependence of patent rights and plant breeders' rights.

Summarizing some of the conclusions of that meeting, I think opinions were just about evenly divided about whether there should or should not be exclusions, although it is quite difficult to be statistically precise on the question, I think that most people felt that the plant breeders' rights was nonetheless the most effective and usual form of protection for plant varieties and the meeting received some quite interesting statistics. The Australian Patent Office is open to granting patents for plant varieties. We learned that within a period of about 8 years or so they granted 3 patents for plant varieties while within 12 months of the new plant variety protection office being established in Australia, the office received about 100 applications. This tells us something about how plant breeders are able to relate to the two systems. Most people felt that probably breeders' rights was the most effective form of protection. I think most people were conceptually happy with the notion of the patented gene that embraces a plant variety and I think also that most people recognized that the position of farmers was rather special. They did not think the farmer should have unlimited rights and that the whole question of farmer's privilege should be looked at with great care. You need to look at the detailed documents etc, if you really want to find out exactly what happened in that meeting. It was not a meeting that made decisions. It was a first meeting where patent circles and breeders' rights circles sat down and talked about the same issues in the same meeting.

Of course our contribution in UPOV to this whole interface question lies within the UPOV Convention revision process, because this revision is taking place in the light of all the developments in biotechnology and of the interface debate.

In the preparation of proposals for the revision of the UPOV Convention, progress has been made since the January 1990 Committee of Experts meeting. Meetings of the Administrative and Legal Committee of UPOV were held in April and June 1990 to consider the revision proposals. The proposals, revised in the light of the discussions at these meetings are now embodied in documents IOM/5/2 Rev. and IOM/5/3, copies of which can be made available on request to the UPOV Office.

A meeting with international non-governmental organizations will be held in Geneva in October 1990 in order that UPOV may hear the views of these organizations on the proposals. Immediately thereafter the proposals will be the subject of further discussion in the Administrative and Legal Committee of UPOV

and will then, with such further amendments as may be deemed desirable, be submitted to the Council of UPOV for approval. If the Council so decides, a diplomatic conference will be held in March 1991 at which the proposals will be considered as a draft for a further and revised Act of the UPOV Convention.

So far as the interface is concerned, the proposals seem likely, apart from enlarging the general scope of protection, to contain three items of particular interest for the interface. They seem likely to contain a definition of plant variety. Both patent and breeders' rights circles expressed support for the development of a definition which would be acceptable in both patent and breeders' rights circles.

Secondly, the proposals seem likely to include the right for the breeder to exclude others from exploiting not only his protected variety but also any other distinct variety that is "essentially derived" from his protected variety. At present, if a gene is added to a variety so as to express a distinctive characteristic, the genetically modified variety is likely to be independently protectable without obligation to the breeder. The effect of the "essential derivation" principle will be to require the person effecting the genetic modification to seek permission from the plant breeder before selling the modified variety.

A breeder can spend 15 years developing a variety. If somebody then adds a gene to it, the modified variety is a distinct variety. The laboratory procedure can perhaps be done in two or three months--in years ahead it will be rather routine--and you then have a completely distinct variety free from the protection of the first variety. Plainly we wish people to continue spending 15 years developing new varieties because the sort of improvements that we can derive from work involving the recombination of genes cannot be duplicated by biotechnologists modifying a small number of genes. We need work involving the recombination of genes to continue as well as work on the improvements that can be achieved by adding one or two genes. So it will be quite wrong in principle if the patenting of developments in biotechnology had the effect that people were discouraged from continuing with the genetic structure building process of traditional plant breeding. We need both things to happen. What we hope to have in the future will be a situation where if somebody adds just one gene to a variety, the modified variety will be essentially derived from the first variety and the genetic engineer will not in that case be able to market the modified variety without a licence from the breeder of the original variety. This would create a balance situation between breeders' rights and patents. If you think back to the example of the theoretical patented gene, if anybody uses that gene you can follow the gene wherever it goes in order to exercise his patent rights. Similarly with the essentially derived variety the breeder who has created the varietal structure can follow his structure wherever it goes notwithstanding the various modifications that are added to it. In that sense the 2 systems will be much more balanced in the future than they are at the present time. That is a very important aspect of the interface that we hope will be addressed in the revised Convention.

Thirdly, it seems likely that the proposals will be silent on the question addressed by Article 2 of the 1978 Act of the Convention, the so-called prohibition of double protection. If a revised Convention is similarly silent, this will mean that States will be free to decide whether patent protection or plant breeders' rights, alternatively or cumulatively, shall be granted for plant varieties in their territories.

The revision of the UPOV Convention will effect a significant strengthening of the protection afforded to plant breeders in UPOV member States and will represent a first concrete step in addressing the questions which arise in relation to the interface between breeders' rights and patents. Most of the issues will, however, remain outstanding and will only be resolved over time.

There have been rather few patents granted in the field of plant innovation in most countries and even fewer such patents have been the subject of litigation. Whilst the subject of patents for plant genes can be discussed in general terms, the precise circumstances in which such patents will be granted remain unclear and the scope of protection available is even less clear. Until more such patents are granted and litigated the true nature of many of the problems of the interface will remain unclear.

Even in the United States of America where patents are granted for plant varieties, the amount and kind of innovation which is necessary to satisfy the inventive step or non-obviousness criteria has not yet been widely clarified by practical example.

The revision of the UPOV Convention will not change the interface situation except in the specific ways that I have suggested. Article 53(b) and its exclusion of plant varieties from patenting will remain as a provision of the European Patent Convention. Similar exclusions will remain within the national laws of many States. Changes to the relevant provisions of national laws seem likely to be fiercely debated. All UPOV member States will continue to be bound by the provision of the 1978 Act of the UPOV Convention for many years to come in relation to one or other of the existing member States.

A number of States who wish to maintain the exclusion of plant varieties from patenting, but who have nonetheless favored the absence of a provision prohibiting double protection in a revised UPOV Convention, have made it clear that the absence of this provision in the UPOV Convention will not predetermine the outcome of future discussions on whether plant varieties should or should not be the subject of patent protection. The subject of exclusions may also be influenced by the TRIPS discussion of the Uruguay Round in GATT and by current proposals for the harmonization of patent laws.

Meanwhile, however, amidst the uncertainties arising from so many current discussions underway in different fora, UPOV is hoping to make a substantial improvement in protection available to innovators in the field of plants with the current proposals for the revision of the Convention.

DISCUSSION

1. Mr. Lange asked why the UPOV Convention would be silent after its revision on the question of "double protection" and whether, in Mr. Greengrass' opinion, the silence of the Convention would influence the interpretation by courts of Article 53(b) of the European Patent Convention and similar provisions in national patent laws excluding plant varieties from patentability.

2. Mr. Greengrass replied that it was well known that there were differences of opinion among member States as to whether there should be an article on "double protection" in the Convention. For the revision of the Convention to be successful, there had to be a certain level of consensus, and it was not at all clear whether that level would be achieved if the inclusion of a provision on this question were on the agenda. In fact, a fairly large number of member States would not like to see a provision included. One consideration in this respect was that it was more important to revise the UPOV Conventionto improve the protection available to breeders under the Convention than to spend much time and effort in a sterile argument about whether there should or should not be "double protection" for plant varieties. Many people were of the opinion anyway that the UPOV Convention provided such an effective protection system for plant varieties that, once strengthened, it would stand on its own feet whether there was an exclusionary provision or not.

3. As to the second question, Mr. Greengrass felt that, strictly speaking, there should be no relationship between an event yet to come and the interpretation by courts of legal provisions that had been on various statute books for many years. The silence of the UPOV Convention on the question of "double protection" would not allow the conclusion that the UPOV member States would no longer be concerned about the patenting of plant varieties. A number of member States were known to be very keen to have a demarcation line between patents and plant breeders' rights and had made it clear in their statements that they still regarded that as a major issue and that the absence of a provision in the UPOV Convention just enabled the issue to be debated more freely; if there still were a provision in the Convention, in many countries, discussions could not even be started because the exclusion would be entrenched in a particular treaty. It had also been pointed out that Article 53(b) of the European Patent Convention related not just to plant but also to animal varieties, that its amendment could not just concern plant varieties and that most interested parties would be reluctant to open the debate on animals because its emotional implications.

4. Mr. Urselmann referred to the statement that the patent protection of a gene introduced into plant material (a plant variety) would continue in that material so that certain acts with that material would be covered by the patent. He agreed with that statement and noted that breeders and gene technologists concurred with that view. He asked Mr. Greengrass to elaborate on the specific problems that would arise if plant varieties as such would be protected by patents and more specifically on the consequence of acts done with plants when there was also a patent on a gene.

5. Mr. Greengrass responded first that the existence of "problems" depended first and foremost on the perspective from which the issue was looked at and on the attitude towards that issue. There was, however, a policy problem for governments, which had to decide whether they wished plant varieties to be patented and to benefit from a form of protection that did not conform to the underlying policy aspects of the plant variety protection system. One other question was certainly, as mentioned in the lecture, the application of the distinctness, homogeneity and stability criteria of the UPOV system in relation to patents granted for plant varieties. The magnitude of the problem would depend on the number of patents issued, should those criteria not be applied and should there be no sensible communication between the two systems. It would be a large problem if many patents were granted for plant varieties and if the inventive step requirement of the patent system was interpreted in such

a way that almost any distinct plant variety represented a patentable invention. Perhaps one way out of this would be to ensure that if the patent system were to be extended to plant varieties, it would apply the DUS criteria of the UPOV system; then, at least, the two systems would not damage each other.

6. There was still another area which might cause concern to the plant breeding industry, and that was the fact that claims could be made in relation to a patented plant variety, with the possible effect that competitors would be totally excluded from from a whole field of activity or would only be able to work in that field if they had a licence. Some people said that this was perfectly acceptable and normal if the inventive step of the first breeder was of real significance; many plant breeders felt that this was threatening the future of plant breeding, which was based upon incremental improvements, since the exclusion of competitors from a significant field of activity would mean less people making incremental improvements.

7. Mr. Urselmann asked whether Mr. Greengrass would concur with him that the meeting organized by the International Chamber of Commerce and hosted by UPOV and WIPO in April 1990 had provided solutions to the potential areas of conflict, specifically in relation to the "breeder's exemption" and to the "research exemption"--which seemed to be the most significant potential problem as the patent system did not specify what steps were free in the experimental phase--and to application of the DUS criteria or limitation of claims to plant varieties as such.

8. Mr. Greengrass explained that the meeting referred to resulted from the fact that the joint meeting of WIPO and UPOV held in January 1990 could not complete its discussions on all the items on the agenda. This lead the non-governmental organizations to ask for another opportunity for, in particular, plant breeders and the circles with patent interests to discuss and find real solutions to the problems. Since the joint meeting could not be reconvened, a separate meeting had been organized by the International Chamber of Commerce at the headquarters of UPOV and WIPO.

9. The meeting had produced a conclusion, the main element of which was that there would not be too many problems with granting patents for plant varieties if two provisions were made in the patent law: first, if a patent were to be granted for a plant variety, then the DUS requirements should be met, so that varieties protected in the UPOV system and varieties protected in the patent system could be compared because the existence of a common data base; second, it should be made clear in the patent system that a patented variety could be used as a parent to create another variety. Whilst in many countries the research exemption in the patent system would cover this situation adequately, there were some others like the United States of America where the situation was not clear.

10. Mr. Christensen asked whether the WIPO patent experts had come to a proposal as to how to solve the problem of the doctrine of exhaustion when applied to plants.

11. Mr. Greengrass replied that they had made proposals for specific legislative changes to clarify that patents for biotechnological inventions would extend to the replicated or modified materials. The suggested solutions might eventually be reflected in legal texts, either laws or conventions, but it seemed that the issues for which solutions had been suggested would continue to be discussed for quite some time.

THE EXPERIENCE OF A MEMBER STATE OF UPOV

by

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The patent law entered into force in Hungary in 1969 and made the patenting of new plant and animal varieties possible. In practice, however, the lack of interest and certain administrative restrictions hindered the widespread use of this form of variety protection. An example of such a restriction was, for example, that state institutes could only apply for a variety patent with the permission of the Ministry and the grant of these permissions was often late.

Under such circumstances, during the period 1969-1983, only three to five varieties were the subject of patent applications.

A turning-point arrived in 1983 when Hungary acceded to the UPOV Convention. Prior to our accession our patent law had been modified so as to protect plant varieties in accordance with the provisions of the UPOV Convention.

Hungary has extended variety protection to all plant species and protection is granted in the form of a patent but in accordance with the UPOV rules for plant breeders' rights.

During the process of granting patents the work is divided between the National Office of Inventions (OTH) and the Institute for Agricultural Qualification (MMI).

An application for a variety patent must be submitted to the National Office of Inventions. It must contain the application and the variety description. The variety description should include those morphological and biological characteristics which enable the variety to be distinguished from other known varieties.

Simultaneously with the patent application the breeder may give the MMI an order for the conduct of the DUS tests through the OTH or directly.

The variety description and the completed "Technical Questionnaire" established by UPOV for each species have to be attached to the order.

The Technical Questionnaire includes:

- information on origin, maintenance and reproduction of the variety,
- in the case of hybrids the formula of the hybrid,
- the most important morphological characteristics which are necessary to plan the distinctness tests,
- any other additional information which is necessary or may help in the conduct of DUS tests.

The seed required for testing and long-term storage should be delivered to the Institute (MMI) at least two months prior to the sowing date.

After the application is received, a file is opened and the data are dealt with confidentially until the examination is completed.

The OTH takes notice of the breeder's declaration about the novelty of the variety and the suitability of its denomination. If the denomination of the variety does not meet the UPOV requirements, the breeder is asked to give another denomination.

The MMI carries out the distinctness, homogeneity and stability tests according to the UPOV Guidelines and methods.

The tests are conducted at 1-2 sites in two replicates, for at least two years, or for the period prescribed by UPOV.

The Institute (MMI) gives an official report on the test results to the breeder and the OTH.

If the variety meets the patent requirements based on the results of the tests, the OTH grants the patent for the tested variety.

Before making our experiences known to you, I should like to speak briefly about two questions.

The first question--which was often raised in 1983--is what advantages we expected from our accession to the UPOV Convention?

Our reply was the following:

- Varieties developed in Hungary may have the same protection in the UPOV member States as in Hungary.
- The Hungarian breeders may apply for protection for varieties which do not have a good market in Hungary but have a market abroad.
- It may promote the safe export of seed of the Hungarian varieties.
- Foreign breeders will be able to bring their up-to-date varieties with full confidence to Hungary.

The other question is the variety registration (the placing of varieties on a list of varieties suitable for Hungarian conditions) and variety patent application. The two things are different from each other; however, there are certain connections which can be demonstrated by the following:

- In Hungary only seed of state registered (qualified) varieties may be produced.
- For state registration, DUS tests are necessary in addition to the successful completion of performance tests.
- For granting a patent, the DUS tests are decisive and the detailed performance tests are not necessary.
- The State registration is obligatory for seed marketing, but the application for a patent is not obligatory.

After the information presented on the background and the Hungarian procedure, I should like to briefly summarize the experiences of the last six years as follows.

In Hungary the development of the plant variety protection has progressed in accordance with our expectations. This can be proved by the data of **table 1**, from which the following conclusions can be drawn:

Table 1: Plant Variety Patents for Field and Vegetable Crops

Year	Applications for patents			Granted patents		
	Total number	From total: (number)	foreign (%)	Total number	From total: (number)	foreign (%)
1984	19	10	52	4	1	25
1985	41	32	78	1	-	0
1986	19	11	57	1	-	0
1987	22	3	13	25	19	76
1988	70	42	60	11	2	18
1989	101	66	65	6	3	50
Total	272	164	60,2	48	25	52

- The number of applications for variety patents has gradually increased from 1983, both from home and foreign breeders.
- The Hungarian breeders have become aware of their interest in variety protection and they apply for patents for more and more varieties. Parallel to this, the export of seed of Hungarian varieties and the protection of Hungarian varieties abroad have increased.
- The foreign breeders bring their varieties with greater confidence to Hungary a claim which is supported by the fact that 52% of the variety patents granted up to now are foreign varieties (Table No. 1). During the period studied, the seed multiplications of the foreign varieties have increased. Till now from foreign breeders, the United States of America and France have applied for the most patents, 61 and 46, respectively.
- So far patents have been applied for varieties belonging to 28 plant species, but the majority of the varieties are of the three most important species in Hungary: maize, sunflower and wheat.
- During the last six years the number of varieties submitted to state registration has also increased considerably, by 181%, as can be seen from Table No. 2. The number of applications for variety patents has, however, increased far more rapidly by 508%. One reason for this, besides the above mentioned potential advantages of variety protection, can be found in the improved financial prospects. Thus, for a variety which is only "state registered" the breeder receives a royalty for the use of the variety which is a fixed amount, e.g. in the case of wheat this is 2.8% of the price of the purchased seed quantities. For a variety which is both state registered and protected by patent a licence fee is paid which varies depending on an agreement, generally 5 to 8%. To sum up, it can be stated that the variety protection system introduced in the frame of the UPOV Convention has generally functioned successfully in Hungary.
- During the last six years the number of variety patent applications has dynamically increased and the degree of increase was superior to that shown in applications for state registration.

Table 2: State Registration of Field and Vegetable Crops

Year	Number of applications for variety registration			Number of Registered Varieties		
	Total number	From total: foreign (number)	(%)	Total number	From total: foreign (number)	(%)
1984	130	41	32,3	50	10	20,0
1985	176	46	26,1	47	9	19,1
1986	151	10	6,62	31	11	35,4
1987	205	77	37,5	59	20	33,8
1988	248	77	31,0	52	14	26,9
1989	237	97	40,9	54	20	37,0
Total	1.147	350	30,0	293	83	28,9

- The benefits which were expected from the accession to the UPOV Convention have mostly been realized.

For the successful operation of the variety protection system introduced within the framework of the UPOV Convention we received a lot of help from the Agricultural Section of the Association for the Protection of Industrial Property and from the Association of the Hungarian Plant Breeders.

These organizations have established a wide circle of breeders acquainted with the essence and methodology of plant variety protection.

I especially express my thanks, here today, for their assistance.

Notwithstanding our positive experiences, if we were to accede today, afresh, to the UPOV Convention with the benefit of our experience, we should, in my opinion, think over some questions more thoroughly, and possibly we might have decided on a slightly different approach. For instance:

- It is not justified to extend the variety protection in the first years to all plant species. The establishment of the necessary resources in personnel and material and organization of the practical work takes a long time.
- It is perhaps better if a single institute--which conducts the variety trials--is responsible for the variety protection. Although the cooperation with the National Office of Inventions is very correct, the bureaucracy is bigger and information flows more slowly, if two institutes carry out one task.
- We should think it over thoroughly whether instead of a patent, the protection of new varieties should be granted by a "plant breeder's right." The majority of the European countries use this form of protection.

DISCUSSION

1. Dr. Bobrovszky opened the discussions by stating that, in practice, there were two patent systems in the same patent law in Hungary: the general (utility) patent system and a special chapter in the law which was tailored in accordance with the requirements of the UPOV Convention. Under that chapter, the paper examinations were carried out by the National Office of Inventions and the DUS tests by the Institute for Agricultural Qualifications. The latter tests in turn formed the substantive basis for the decisions of the National Office of Inventions on the grant or denial of the patent.

2. Mr. Johannson asked whether the term "plant patent" meant in essence the same as "plant variety protection" or "plant breeder's right" under the UPOV Convention.

3. Dr. Szalóczy referred in his reply to the explanations by Mr. Greengrass on the differences between patents and plant breeders' rights and stated that the requirements for the plant patent (or variety patent) were the same as for the breeders' rights. Therefore the difference was only in the form in which a right was granted, and not in its content.

4. Dr. Fuchs, referring to the statement by Dr. Szalóczy that an applicant for a patent for a hybrid variety had to submit the formula of the variety, asked whether the hereditary components were included in the the DUS tests.

5. Dr. Szalóczy replied that the hereditary components were also examined.

6. Mr. Urselmann asked why it was found necessary to test also the inbred lines in relation to an application for a hybrid variety.

7. Dr. Szalóczy replied that this procedure was used in particular in the case of the maize because the genetic basis of maize was very narrow and the inbred lines were often very close to each other. The examination of the inbred lines therefore permitted to gather valuable additional information.

8. Dr. Fuchs added that a further justification for the testing of the inbred lines was that it permitted the hybrid as such to be adequately judged concerning its homogeneity. This was the only way to determine the particular requirements for the hybrid, in view of the fact that there were different requirements for the different types of hybrid, and also to establish an adequate basis for the decision on the distinctness of the hybrid. With the knowledge of the formula and of the characteristics of the inbred lines, one could even base the decision on distinctness on the conclusions with regard to the segregation of the states of expression.

9. Mr. Greengrass referred to the statement by Dr. Szalóczy that, if plant variety protection were to be introduced again, the Hungarian authorities would not choose to extend protection to all species from the outset. One proposal put forward in the revision of the Convention was to introduce an obligation for member States to protect all species much quicker than they had in the past. In the light of that proposal it would be of interest to know what difficulties had been encountered in practice because of the decision to extend protection to all species from the outset.

10. Dr. Szalóczy replied that it took quite some time to establish the necessary infrastructure for the DUS tests.

11. Mr. Christensen asked Dr. Szalóczy for some more details on the background to the decision to introduce a special chapter on plant and animal varieties in the patent law.

12. Dr. Szalóczy turned the question to Dr. Bobrovszky since he had not been involved in that decision.

13. Dr. Bobrovszky stated that the independent national patent system dated back to the end of the last century; and there was before it a joint patent system with the Austrian Empire. In 1895, the Hungarian Parliament enacted the first independent Hungarian national patent law which included the same requirements for the grant of a patent as those which were internationally accepted, namely novelty, inventive step and industrial applicability. Quite understandably there were no provisions concerning new plant varieties or biotechnological inventions. In the absence of any exclusionary provision concerning this subject matter, there were already in the 40's and 50's some sporadic court decisions which expressed the opinion in obiter dicta that the biological phenomena were not excluded from patent protection. At the end of the 60's, when the present patent law was drafted, the question arose whether there should be an independent plant breeders' rights system or whether that matter should be regulated in the patent law. In Dr. Bobrovszky's opinion there were at the time three reasons for including special provisions into the patent law.

(i) Firstly, Hungary was the only country in the region which had refused the so-called "inventor's certificate," which was an accepted form of protection of inventions in the Soviet Union and some Eastern European countries. There was in Hungary a certain aversion for the legal form of the inventor's certificate, which was considered to be a kind of non-proprietary legal document which did not afford any intellectual property rights. The majority of the plant breeders and experts active in this field, for example Dr. Pálos whom Mr. Heitz had mentioned in his lecture, preferred the patent form to the certificate form.

(ii) Secondly, the American patent system had been quite attractive and influential, in particular because the Hungarian plant breeders had close contacts with American firms, notably in relation to maize, and therefore knew that the American patent law provided for a special plant patent.

(iii) Thirdly, the legal regulation which had been adopted previously in the form of a ministerial decree by the Minister of Agriculture provided only a right to remuneration but did not secure any kind of proprietary right. Therefore, the majority of the breeders in those times turned their attention and preference to the patent system.

14. Dr. Bobrovszky added that there were, next to the patent system, other means of redress for the protection of proprietary information. For example, Article 80 et seq. of the Civil Code could be used in relation to confidential information, for example concerning hybrid varieties. If somebody infringed the trade secret court proceedings could be instituted against him with a view to obtain an injunction for the damage. According to the general principles of the civil procedure, the burden of proof lies with the plaintiff. Another protection system was available through the Law Against Unfair Competition.

THIRD SESSION

THE IMPACT OF PLANT BREEDERS' RIGHTS ON THE PLANT VARIETIES AND SEEDS INDUSTRY AND ON THE TRANSFER OF TECHNOLOGY

Chairman: Barry Greengrass, Vice Secretary-General, UPOV

A PLANT BREEDER'S VIEW--THE IMPACT OF PLANT BREEDERS' RIGHTS UPON THE PLANT BREEDING AND SEEDS INDUSTRIES IN AN ENTERPRISE ECONOMY

by

François Desprez, General Manager, Maison Florimond Desprez, France

INTRODUCTION

The agricultural statistics that are available in many countries as from the beginning of the century make it possible to accurately assess the increase in production and yield for the major cultivated species.

This data shows that there was a relative stagnation of yield between 1900 and 1930, a regular gain in productivity from 1930 to 1960 and an even more rapid progression of yield from 1960 to 1990.

A closer look will show, however, that progress has not always affected all species in the same way.

For instance, in the United States of America (see table 1), wheat and maize yields have grown since 1960 at a rate much above that of the preceding period, whereas the yield of soybean has continued its slow increase.

Table 1: Annual Rates of Yield Increases in the United States of America (kg/ha/year)

Crop	1900-1930	1930-1960	1960-1990
Wheat	0	15	30
Corn (maize)	3	60	150
Soybean	-	20	20

Source: US Department of Agriculture

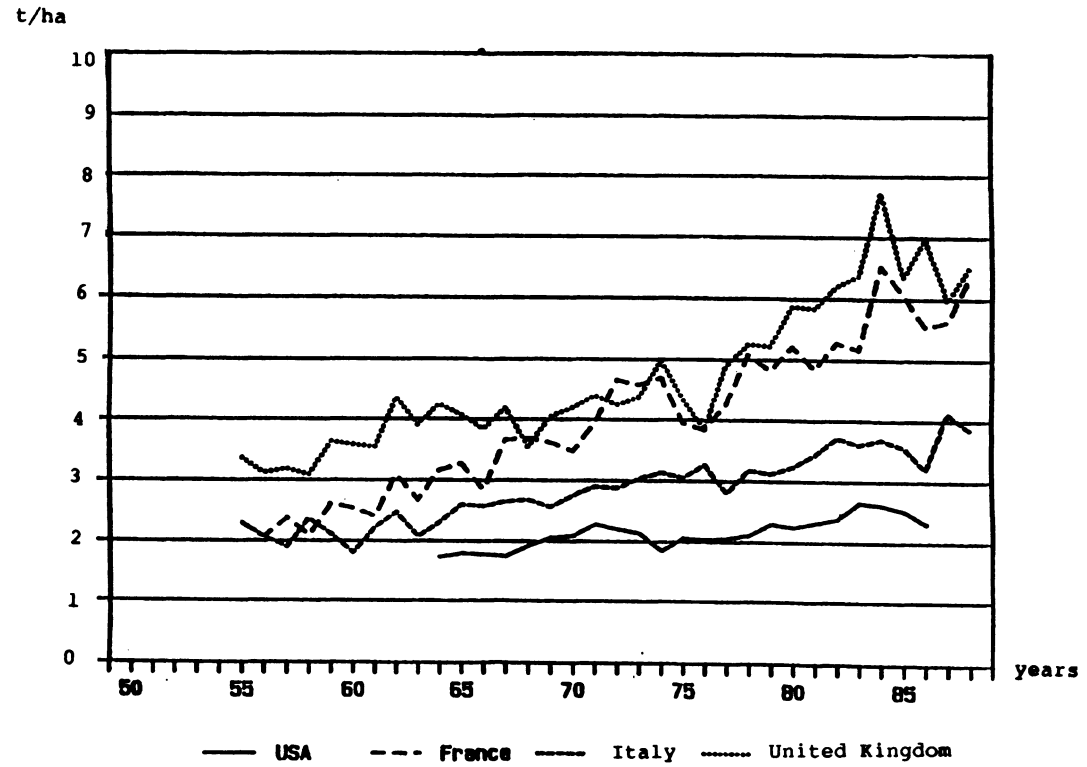
It may also be seen that, for one and the same species, the increase in yield and the level achieved vary from country to country. For example, wheat yield has developed much more favorably in France and in the United Kingdom since 1955 than in Italy and, above all, in the United States of America (see figure 1).

Agronomists are agreed that these gains in productivity are due to breeding and changes in growing techniques (increase in nitrogen fertilizers and improvement in weeding).

The various models for assessing the genetic factor and the agronomic factor generally evaluate the percentage gain in yield deriving from plant breeding at between 40 and 50%.

We must therefore admit that since 1960 the effectiveness of plant breeding and of the seed industry has grown and contributed largely to the development of agricultural production, particularly in Europe and North America.

Figure 1: Evolution of Wheat yields in Four Countries



Source UNCA

It is obvious that the signing of the International Convention for the Protection of New Varieties of Plants on December 2, 1961, has largely contributed to the dynamics of the seed industry for almost 30 years.

Indeed, we may note that a species that was not originally protected anywhere, such as soybean, has not enjoyed a distinct progress in yield since research efforts have not been devoted to it.

In the same way, countries that have not acceded to the Convention are characterized by lower yield, that is more irregular and of limited progress, particularly in the case of self-fertilized species, above all the small grain cereals and protein plants (see table 2).

The absence of protection and of recognition of breeders' rights therefore diverts plant breeding endeavors from those geographical areas.

Breeders' rights thus have a real impact on plant breeding and the seed industry.

France, which was one of the first five signatories of the 1961 International Convention, constitutes a perfect illustration of the highly positive effect of UPOV on a national seed industry.

Table 2: Evolution of Yields (t/ha)

	1984	1985	1986	1988
USSR	1,34	1,55	1,89	1,86
China	2,97	2,94	3,04	3,01
USA	2,61	2,52	2,31	2,53
India	1,84	1,87	2,03	2,04
EEC (12 MS)	5,13	4,62	4,56	4,75
Canada	1,61	1,77	2,20	1,95
Australia	1,54	1,38	1,44	1,36
Argentina	2,30	1,62	1,82	2,06
Turkey	1,91	1,84	2,03	2,02
World	2,23	2,19	2,35	2,35

Source: FAO

1. IMPACT OF PROTECTION ON RESEARCH

The implementation of the Convention, known as the Paris Convention, has had a direct influence on research in plant breeding from three complementary points of view:

- remuneration of research
- access to germplasm
- necessary innovation.

1.1 Remuneration of Research

Prior to the signature of the Paris Convention, various countries such as the Netherlands or the Federal Republic of Germany had set up national systems of protection that guaranteed plant breeders remuneration for their work. This fact no doubt explains to some extent the success of the Netherlands in the plant breeding market.

Through the establishment of protection, the contracting States endeavored to safeguard the interests of their breeders.

It was therefore possible to set up in the signatory countries arrangements for collecting license royalties for seed of protected varieties that were compulsory for all market operators.

This permitted the breeder of a self-fertilized variety to manage the development of his variety and for the breeder of a hybrid to avoid plagiaries and copies.

In France in 1990, SICASOV, the collecting society for breeders' rights, collected almost 400 million French francs from establishments producing varieties enjoying protection. Three-quarters of that amount were collected in respect of the certification of seed for small grain cereals, protein plants and oil plants. Vegetable seed, fodder seed and seed potatoes are also subject to this system.

In the United Kingdom, the amounts collected exceeded 12 million pounds and in the Federal Republic of Germany they reached almost 30 million Deutsche Mark.

The whole of this financial mass is paid over to the breeders and enables them to maintain a research effort which is today highly significant and represents a driving force in the development of agriculture.

Expenditure on research in plant breeding in France can be evaluated at almost 500 million French francs, that is to say more than 5% of the value of sales (see table 3).

Table 3: Research Expenditures in Plant Breeding in 1988 (Million French Francs)

	Expenditure	Turnover	%
France	490	9,000	5,4
EEC	1,370	27,000	5,1
USA	2,050	36,000	5,7
World	4,000	90,000	4,5

Likewise, in the EEC, where practically all members belong to UPOV, the private and public breeding budgets reach an amount of 1,500 million French francs.

The United States, that signed the Convention in 1978, devotes more than 2,000 million French francs to plant breeding.

It will be noted therefore that the countries that protect the interest of plant breeders represent together over 80% of innovative activities, which therefore explains the continuous progress of their agriculture.

It may also be noted that protection is beneficial to both public research institutes and private firms.

Application of the Convention therefore makes it possible to lawfully remunerate research, but at a cost that is acceptable to the user.

In France, the use of a protected variety of wheat, and therefore a better variety, costs the farmer some 40 French francs per hectare, or 40 kg of wheat, whereas the national average yield in 1990 exceeded 6.5 tonnes per hectare!

1.2 Access to the Germplasm

Article 5(3) of the UPOV Convention provides that the breeder's authorization is not required for the use of a variety as an initial source of variation for the purpose of creating other varieties or for the marketing of such varieties.

This provision, known as "research exemption," therefore makes it possible for every breeder to utilize in his breeding program any other new, improved variety and is therefore a guarantee of worldwide progress in breeding.

It is thus possible for a breeding team to insert new characteristics of productivity, quality or resistance to various parasites originating from elsewhere into plant material possessing indispensable local adaptation characteristics.

This is not an abuse of innovation since it requires undeniable know-how as regards experimentation and judgment of cultivars.

This "research exemption" means today that there is no obstacle to protected cultivars also enriching the gene banks that guarantee the conservation of the genetic heritage. Among the 3 million accessions preserved in the major banks in 1990 there is an essential proportion of varieties originating from earlier or recent research work developed in the countries party to the Convention.

1.3 Necessary Innovation

Each member country of UPOV issues a title of protection on the basis of three criteria: distinctness, homogeneity and stability.

The conditions for granting the title of protection are set out in detail in Article 6 of the Convention.

The implementation of those rules has meant that the member countries cause an examination to be made for each cultivar by an official service, generally responsible to the Ministry of Agriculture. Distinctness means that the new variety must be different in one or more of its important morphological or physiological characteristics from any other variety whose existence is a matter of common knowledge.

This examination of distinctness, homogeneity and stability constitutes the keystone in the UPOV member countries for the operation of national catalogs and complements the judgment of the value of a variety for cultivation and use.

It avoids the referencing and distribution of pirated varieties whose use would not constitute progress for the farmer.

Each breeder submits for national list testing only those varieties he holds to be better than those already registered.

The existence of protection leads to permanent progress amongst breeders therefore, and also means that new varieties are better than existing varieties.

This is illustrated in France by the fact that the most grown variety in 1990 is potentially better by 50% than its 1960 equivalent.

2. IMPACT OF PROTECTION ON THE SEED INDUSTRY

Application of the UPOV Convention has had a decisive effect on the development of the seed industry both as regards quantity and quality.

2.1 Development of National Markets

All those countries that have actively implemented the terms of the Paris Convention have enjoyed a spectacular increase in production and sales of certified seed.

In France--the second market in the world after the United States of America--the market has grown continuously for 20 years (see table 4).

Table 4: Evolution of seeds sales in France (1000 tons)

Year	1970	1980	1989
Cereals	420	610	730
Maize & Sorghum	60	69	109
Forage Crops	40	59	147
Beet*	700	877	650
Potatoes	190	213	214
Oil & Fibre Plants	-	10,000	12,000

* In 1000 units; 1 unit = 100.000 seeds Source: GNIS

The distribution of seed of small grain cereals has grown by 4% a year since 1970, that of maize at the same rate and that of fodder seed has even exceeded 10% a year.

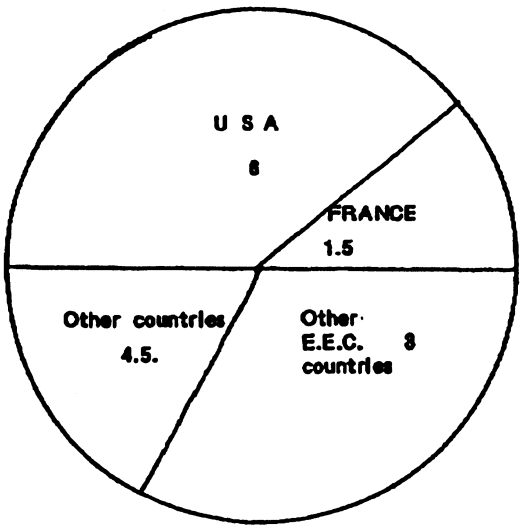
The turnover achieved in France will reach 1.5 billion dollars in 1990.

Looking at things on a worldwide scale, it can be estimated that 15 billion dollars will be the value of the seed market, that is to say more than that of the market for chemical plant protection.

The breakdown by country shows clearly the domination of North America and the EEC, that represent 40% and 30% of the market, respectively (see figure 2).

The largest markets in the world have therefore grown up in the countries party to UPOV: the United States of America, France, Japan, the United Kingdom, Federal Republic of Germany, Italy, etc.

Figure 2: Estimated Sales of Seeds in the World (Billion Dollars)



Source: Precepta

The growth prospects in those countries remain very strong due to the foreseeable impact of biotechnology in this market.

An American consultant forecasts an increase by the end of the century of some 8 billion dollars due to the introduction of plants resistant to herbicides and to certain insects as also due to the development of hybrids in new species.

Since biotechnology research is basically carried out in the UPOV member countries it will be above all their seed industries that will benefit from development.

2.2 Internationalization

Along with the development of national markets, a highly active international trade in seed has grown up, particularly for certain species such as maize or vegetables.

The example of the EEC is significant since certain countries import up to 20% of the amount of national production and export over 30%.

In France, exports in 1987/88 reached 1.5 billion French francs and slightly exceeded the imports assessed at 1.4 billion French francs.

This internationalization of markets is accompanied by considerable specialization. Thus, the Netherlands dominates the fodder grasses market, the vegetable seed market and that of potato plants. Denmark is the leader in perennial ryegrass. The United States of America and France are the overwhelming suppliers of maize seed.

I must add that internationalization also leads to the movement of varieties in the countries that issue a title of protection and for which the breeder receives royalties.

Foreign varieties frequently represent a significant share of the market even in those countries where plant breeding is active.

In France, 15% of certified wheat seed and 25% of certified barley seed are produced for varieties originating basically in the EEC.

2.3 Industrialization

The growth in the demand for seed, thanks to protection, has also led to an industrialization of the production structures.

Large scale investments have been made in all the big seed countries, and the seed industry has become a modern, specialized branch.

The 700 French undertakings that process production of almost 400,000 hectares of certified seed have been significantly modernized due to the value afforded to seed by plant variety protection.

The processing capacity of each unit frequently exceeds 15 tonnes/hour and they are able to deal with the technical problems raised by a difficult or poor quality harvest.

This industrial plant enables seedsmen to adjust to the most brutal changes in demand.

Thus, France has succeeded in establishing in less than 10 years a production of more than 100,000 tonnes of seed of protein peas in response to the exponential growth of area sown to that crop.

2.4 Competition

Application of the Convention has made it possible in all the countries to set up healthy and active competition between those operating in the market. The breeder submits a variety that is distinct from those already existing but which must be better if it is to succeed.

This has led to a rapid renewal of varieties and avoids the maintenance of outdated cultivars. In 1950, the leading wheat variety in France maintained its position for more than 10 years. Today, the best variety remains at the top for less than 5 years.

This competition between breeders is accompanied by competition between producers. This enables farmers to obtain certified seed of recent varieties at a reasonable increasing price and to obtain constantly improved service.

2.5 Quality Standards

In all UPOV member countries, protection is inseparable from certification. The success of a protected variety demands seed of irreproachable quality.

It will be noted that in the main seed countries the quality of seed has been constantly improved. Seed is frequently placed on the market with characteristics that considerably exceed the standards laid down by OECD or the EEC.

In France, practically all cereal seed that is used exceeds 95% germination capacity and has a specific and varietal purity equivalent to the basic seed.

Production requires the seed producer to remunerate the breeder of the variety. This royalty, even if its level is limited, is an element in the costing price of the seed and must therefore be recovered.

In a highly competitive environment, quality remains the best guarantee for moving the product at a price that remunerates the producer.

The approach to quality may be a collective one. For example, in the United Kingdom, the small grain seed producers respect standards that are stricter than those required for certification.

2.6 Phytosanitary Protection

By promoting seed, protection has had the indirect effect of causing the phyto-pharmaceutical industry to show a strong interest in the seed industry.

Today, the prospects offered by seed coating and encapsulating techniques are of great interest. It is probable that a non-negligible part of the treatments with fungicide and pesticide molecules during the vegetation period will be applied to the seed. This will lead in the long run to a new concept of seed again increased by the implementation of biotechnology.

CONCLUSION

It is obvious that the International Convention for the Protection of New Varieties of Plants has been decisive in consolidating the research endeavors devoted to plant breeding.

I have pointed out the dominant role played by the UPOV countries in international research.

The existence of the Convention also makes it possible to pursue biotechnological innovation whose cost is considerable, and its impact on agricultural economies no less great, even if it is today still difficult to evaluate.

Practically, the whole of the three billion dollars devoted to plant biotechnology involves the countries party to UPOV.

However, by promoting the work of the breeder, the Convention has also led to a positive development of the whole seed branch which, in less than 30 years, has changed from a mature to a highly innovative industry. For the user this has meant the availability of seed meeting with ever-increasing quality standards.

The essential part played by the member States of UPOV in this increasingly international market has been demonstrated.

Each State that joins the Union can be assured of the positive development of its seed industry, from research right up to the producer establishments. It therefore at the same time gives its own agriculture a better chance of remaining competitive.

The International Union for the Protection of New Varieties of Plants is, finally, the most adequate forum for settling the legal and economic problems raised by the impact of biotechnology upon the world of plant breeding.

I think I can express an opinion that is representative of the private and public breeders by saying that UPOV has enabled our activity to develop fruitfully by promoting both the breeder and the seedsman.

However, I am also sure that UPOV will enable us to face up to the essential challenges imposed by the progress of plant science by the end of the century.

DISCUSSION

1. Mr. Veldhuyzen van Zanten stated that he fully agreed with Mr. Desprez' statements and that he wished to expressly underline this to the audience. To the comment that protection was inseparable in all UPOV member States from certification, he observed that protection was indeed inseparable from adequate control measures for both quality and quantity distributed. That type of control was needed. It took the form of certification for agricultural crops, but there were also other systems, such as the price mechanisms in vegetables.

2. Mr. Urselmann stated that he had the same remark as Mr. Veldhuyzen van Zanten.

3. Mr. Winter congratulated Mr. Desprez on his enlightening lecture. On a point of detail he observed that he would have preferred Mr. Desprez to speak about a "breeder's exemption" rather than a "research exemption" for the reason that the research exemption which existed under patent law was narrower in scope than the breeder's exemption under the Convention. This was one of the reasons for which a ban on double protection was technically justified.

4. Mr. Greengrass said that, prior to the introduction of plant variety protection in France, there existed a system of collection of royalties for breeders. He asked what advantage the plant variety protection system gave over the practical arrangements under private law.

5. Mr. Desprez confirmed that before the advent of the Convention and the French plant variety protection system, breeders of cereals and seed producers had concluded agreements under private law for the collection of royalties. This had been possible because the production of cereal seeds was largely organized by cooperatives, and breeders were dealing with the unions of cooperatives. The great advantage offered by the protection system was that the enforcement of the agreements became much simpler and in fact almost automatic. In addition, the level of royalties--and consequently the investments in research and breeding--could be increased from the 2% that had been negotiated with the seed producers who had shown goodwill to the current 7 to 8% of the value of the certified. Another advantage was of course the extension to other crops of the possibility of collecting royalties.

6. Mr. Duffhues noted that much had been said about the advantages of plant variety protection for UPOV member States. He asked Mr. Desprez for his opinion as to the advantages for other countries, particularly those in the region to which this Seminar was directed.

7. Mr. Desprez stated that the same advantages would arise for such countries. The whole purpose of his lecture had been to convince the audience that the positive evolution which the plant varieties and seeds industry had undergone in France and other UPOV member States would also take place in other countries joining the Union. He observed that the granting of protection would further cooperation between national and foreign breeders, particularly in the field of self-pollinated crops; it would also increase competition, the best booster for progress. One should not be afraid of the competition of foreign varieties: they would not always be the best ones, but they would surely lead to an overall improvement of the general yielding ability of the varieties under cultivation.

THE ROLE OF PLANT BREEDERS' RIGHTS IN THE TRANSFER OF TECHNOLOGY - I

by

Jasper E. Veldhuyzen van Zanten, Vice-President,
Zaadunie B.V., Netherlands

and

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Over many years in the decades behind us, reliable contacts between Eastern European countries such as Poland, Hungary, Bulgaria, the German Democratic Republic and Czechoslovakia, and Holland were established in horticultural seeds.

These contacts concerned direct sales, contract seed production, including transfer of know-how and technology.

The mutual business between Holland and Hungary, for instance, was based on civil contracts. In 1985, Sluis & Groot* and Vetömag** established a contract setting up a framework for cooperation and providing conditions for sales, production and mutual breeding research.

This contract has served well during a period when Vetömag with its State monopoly was the only determining factor in Hungarian seed growing and domestic sales. However, the development of an economic system based upon diversity of enterprises suggests that competition from private companies will develop. Plant breeders' rights granted under Part III of the Hungarian Law on the Protection of Inventions by Patents which contains special provisions concerning plant varieties and animal breeds will be essential under these circumstances.

Three Sluis & Groot proprietary pea varieties for the processing industry, Jof, Skinado and Coral, will produce 1.5 million kgs of qualified seed in 1990 for Hungarian processors, multiplied from Sluis & Groot's basic seed supplied under quality guarantee.

This quantity is exceeded by another 5 million kgs of pea seed grown for Sluis & Groot on contract and exported back to Holland. Bound only by contract, Vetömag is paying an 8% royalty on the quantity sold in Hungary. In future it will be essential both in the interests of our partners and ourselves to seek plant variety protection as part of our arrangements for making available the products of our technology.

Processors in Hungary can be assured of the quality of these highly desired varieties through the breeder's guarantee.

The same applies for F_1 hybrid Pickling Cucumber seed. Three Sluis & Groot proprietary varieties, Minerva, Santana and Orient, will produce 555 million seeds in Hungary in 1990 from Dutch basic seed.

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* Sluis & Groot is a breeder and exporter of horticultural seed in the Netherlands

** Vetömag is the Hungarian State organization for seed production exports and domestic sales.

The seed production procedure is closely monitored by specialists from the breeding company. They transfer know-how and production techniques to Vetömag, check the purity of the parent lines, guide the growing and harvesting, supervise seed germination and seed treatment. They take care of adjustment of seed lots for adequate pollen supply in the ultimate vegetable production field.

A royalty is paid to the breeder of 25% of the export sales price.

Conversely, Hungarian breeders have produced valuable horticultural varieties, useful for export trade. Sluis & Groot is licencee of several of these varieties, relying on the breeders' skill for delivery of stock seed and compensating them either by royalties or, in a few cases, by paying a lump sum.

The earliest example was that of flowers. Since 1978 Sluis & Groot has been selling annual stocks (Althea) and Gaillardia bred by Professor Z. Kováts. Sales reached a peak when the Hungarian Althea received an award in the "All American Selections" competition.

As a result of the Sluis & Groot/Vetömag Research Contract, a commonly bred F_1 Sweet Pepper variety from Dr. L. Zatyko and Dr. G. Csilléry of the ZKI Budatétény Station is expected to be introduced by Sluis & Groot into selected markets.

Veronika Deák et al of Vetömag Nyiregyháza Research Centre bred the processing pea variety Leda, very suitable for export, of which Sluis & Groot is hoping to produce a pilot quantity of some 10 tons of seed in 1991 for introduction onto the Western European market in 1992. We are currently investigating the breeders' rights position for this variety.

Sluis & Groot obtained exclusivity for two F_1 hybrid varieties of watermelon, Kobald and Favorit, from the breeder Dr. Kálmán Mozsár of the Horticultural University of Budapest. The Budapest Horticultural University will receive a royalty on sales over a four-year trial period, extending into 1991. Exports to Turkey, Spain and Morocco are anticipated. In the past similar arrangements with Western companies concerning non-protected varieties have failed to produce royalties but we hope to do better.

The private contracts between Sluis & Groot/Vetömag have been a success due to the reliability of the partners.

Vetömag never allowed processors to harvest fresh peas that had gone over their quality limit, as a result of hot weather or difficult fresh harvest conditions, to be re-used as dry seed for next year's vegetable harvest. They were consistent in disposing of this by-product for cattle feed and their dominating role as the State seed supply organization sheltered us from heavy reliance upon plant variety protection.

The lessons to be drawn from our experience are the following:

(i) Whilst mutual respect of two trading parties (and the market dominance of Vetömag) meant that intellectual property protection for varieties did not play a decisive role, it will do so in the future,

(ii) In the seed and plant breeding industry, breeding knowledge and skills are not monopolized by western countries; there is the possibility of income flow in both directions.

DISCUSSION

1. Mr. Heitz asked Mr. Veldhuyzen van Zanten for an explanation about the royalty of 25% of the export sales price. He felt it important to give the reason for that royalty which at first sight seemed very high and to indicate what it represented in terms of income for the breeder and expenses for the user.

2. Mr. Velhuyzen van Zanten replied that a very large proportion of the royalty was for the transfer of technology, the real breeder's gain being of around 8%.

3. Mr. Greengrass said, to supplement the answer, that one would expect very big differences between royalties paid in the context of a crop like a small grain cereal and those paid in the context of vegetables. In the first case, very large tonnages of seed were sold, and the margins that were normally available on trading were very small. In vegetables, where the total market for a particular crop may be very small, the research element would represent a much higher proportion of the actual sales price if the research was to be viable. A figure of 25% as given would be perfectly compatible with the 5 to 6% indicated for the research in Western Europe on cereals.

THE ROLE OF PLANT BREEDERS' RIGHTS IN THE TRANSFER OF TECHNOLOGY - II

by

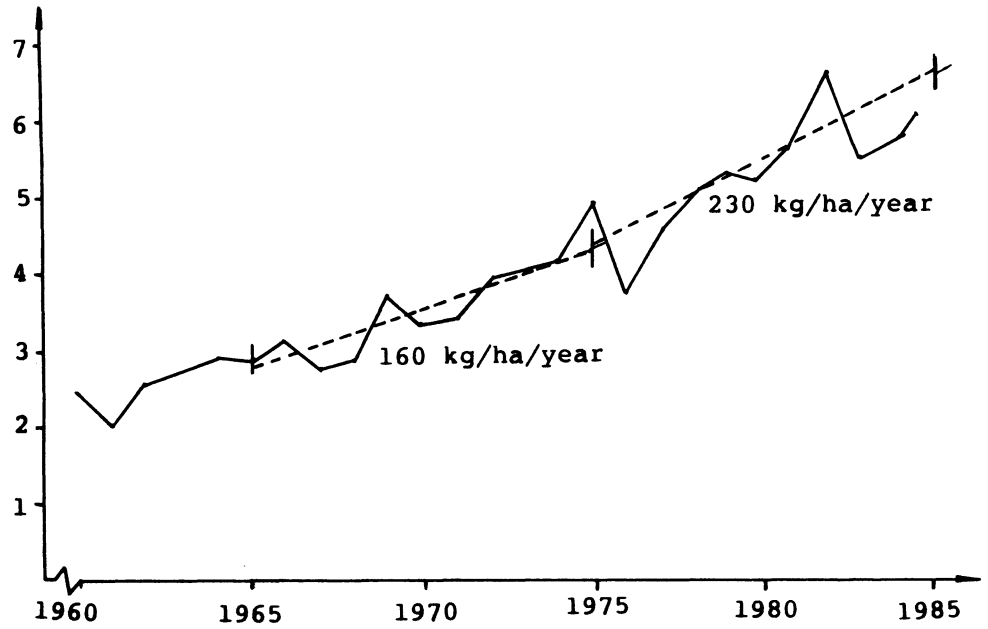
László Kálmán, Head of Maize Breeding Section,
Cereal Research Institute, Hungary

and

Mark Dickey, East Europe Technical Services Manager,
Pioneer Overseas GmbH, Austria

Disregarding the data from several extreme dry years, grain yields of maize in Hungary increased in the past 20 years till the middle of the 1980's at an annual rate of about 160 kg per hectare (figure 1). Thanks to this increase, Hungary is among the leading maize-producing countries with a maize production area over one million hectares. Hungary also has a prominent position as regards the average yield, since it is ranking second or third in the world.

Figure 1: Evolution of national average yield between 1960 and 1985



Yield can be regarded as the resultant of several factors. It includes the effects of the biological basis, the level of mechanisation, the production technology, plant protection, etc. It is assumed that these various factors were dominant in one or another time period and have played a determining role in increasing the national average yield. Several significant events took place in the past 20 years in maize production in Hungary, such as the mutation to large-scale farming, increased use of fertilizers, increased planting density, better weed control, the general improvement of crop husbandry and, last but not least, ever better hybrids.

A plant breeder frequently wonders about the actual gains he has achieved through improved genetics. This will be discussed in a model experiment. In 1988, trials were set out to study the comparative performance of hybrids representing the period from 1966 to 1988. One popular representative for each maturity group of the hybrids from the years 1966, 72, 78 and 88 have

been reconstituted (table 1). The 16 hybrids were investigated at different locations together with a population variety from the 1950's. The overall evaluation is summarized in table 2. The yield results given as the average of the maturity groups and trial locations reflect well the importance of the change in the genetic background. The level of genetic improvement was estimated at 175 kg per hectare and per year on the afore-mentioned basis. The effectiveness of the breeding and adaptation work can also be measured on factors others than yield increase. Significant improvements can be shown for example for the root and stalk traits (table 3). The performance, in terms of yielding ability and yield stability, of the new hybrids commercialized since the middle of the 1980's has been far better than that of the hybrids of the 1970's.

Table 1: Representative hybrids from the period 1966-1988

Maturity Group/Hybrid		Pedigree	Year
FAO 200			
1	Georgikon DC 250	A111 x F7	1966
2	Mv Tc 290	W153 x EP1	1972
3	Anjou 256	W401 x Ma21	1978
4	x 3902	-	1988
FAO 300			
5	Georgikon TC 302	W153 x C44	1966
6	KSC 360	A90 x W153R	1972
7	NK-PX 20	A632 x W117	1978
8	Pannonia	-	1988
FAO 400			
9	N6 x Oh43	-	1966
10	OSSK 218	W64A x W153R	1972
11	MvSC 429	156 x HMv401	1978
12	Chiara	-	1988
FAO 500			
13	MvTC 540	Bco3 x B125	1966
14	MvTC 530	156 x N6	1972
15	MvTC 580	156 x B14	1978
16	Volga	-	1988
	(Aranyözön)	population	1950's

It is not accidental that Pioneer hybrids gradually spread in Hungary at the beginning of the 1980's. They currently provide more than 70% of the biological background to maize production. They have much better agronomic traits than the former hybrids.

Let us now turn our attention to the role of the public lines produced in the 1960's or at the beginning of the 1970's by the universities in the United States of America. Those lines were available not only to the American breeders, but actually to everybody, and many commercial hybrids originated from

them too. At that time, it was very important to get the best lines and to develop the best hybrids from them. The development of breeding populations and inbred lines was pushed into the background.

Table 2: Yield and Protein Content of the Hybrids Given in Table 1 (average over maturity groups and locations; 1988)

Year	Yield (t/ha)	Protein Contents (%)
(1950's)	6.49	9.96
1966	8.52	9.38
1972	8.83	9.84
1978	9.70	9.66
1988	12.55	8.61

In the meantime, private companies well provided with capital gradually invested more and more money and intellectual work into maize breeding and line development. Maize breeding is now dominated by business relations. The lines developed by private companies do not become public property, legally, but are owned by them. The pedigrees of the hybrids are secret. The research results of the private companies can be utilized in maize production only by purchasing hybrid maize seed, or the hybrids and their parental components.

Table 3: Important Agronomic Traits of the Hybrids Given in Table 1 (average over maturity groups and locations; 1988)

Year	Days from planting to 50% female flowering	Root lodging (%)	Broken stalks (%)	Ustilago maydis (%)
(1950's)	79	10.0	31	8
1966	74	9.4	24	5
1972	74	7.0	10	8
1978	76	4.6	8	7
1988	77	1.4	3	3

The Cereal Research Institute widened the domestic choice of maize varieties by introducing Pioneer hybrids as from 1975. Their introduction can be considered as a real success as Pioneer hybrids, which are among the leading ones in the world, are grown on more than 70% of the domestic maize growing area. This high proportion was attained in an open market competition, in which all significant breeding companies of the world were present. Since 1975, 22 Pioneer hybrids have been registered in Hungary; at present, 18 are grown. The seed demand for Pioneer hybrids amounts to 67% of the total domestic demand.

In the past decades, the Pioneer hybrids were essential in grain maize production in Hungary and, on the basis of the results of the new experimental hybrids, it can be assumed that they will still have an important role in the future.

Pioneer has put at the disposal of the Institute its own private lines which are used as parental components in the maize seed production in Hungary, for breeding jointly-owned hybrids. The replacement of their importation was worth 3.52 million US dollars per year in the past 15 years on the average.

Since 1986, the Institute has been authorized to use Pioneer lines to develop maize hybrids for domestic production. The success of this breeding work can be demonstrated by the fact that, in the last two years, six jointly-owned hybrids have been registered in Hungary.

The cooperation has further advantages which cannot be demonstrated easily with figures, for example, the sharing of knowledge about the most modern breeding methods, their immediate application, the participation in the international scientific flow of plants, etc.

The advantages of the Pioneer hybrids for the economy of Hungary are straightforward. The present licence fee charged by the Pioneer can be recovered with 23 kg additional yield, on the basis of 120 US dollars per metric ton of grain maize. The Pioneer hybrids yield many times more than this licence cost per hectare; there is therefore no doubt about their profitability.

As regards the status of the Pioneer hybrids introduced in the past 15 years, there is a great difference between the period from the middle of the 1970's to the beginning of the 1980's and the following one. At the early stages of cooperation, the Pioneer hybrids introduced into Hungary had already been registered and commercially produced either in North America or in France. In contrast, the majority of the Pioneer hybrids tested in the Institute's breeder's trials since the middle of the 1980's have been new hybrids, which had not yet been commercialized in other countries. They are introduced in Hungary and in Western Europe almost at the same time (table 4).

Table 4: Date of Release or Registration of Commercial Hybrids

Reference (Denomination)	USA	France	Hungary	Difference (years)	
3780 [3780A in France]	1972	1975	1978	+6	+3
3732	1976	-	1981	+5	-
3707 (Sabrina)	1983	1983	1986	+3	+3
3737 (Pannonia)	1985	-	1988	+3	-
3475 (Volga)	1985	1987	1988	+3	+1
3707 (Helga)	1989	1989	1990	+1	+1
3707 (Chiara)	1988	-	1990	+2	-
3707 (Marieta)	1988	1990	1991*	+3	+1

* Year of expected registration

The quicker introduction of new varieties was made possible, without doubt, by the adoption by the Republic of Hungary of Decree-Law No. 14 of 1983, on the International Convention for the Protection of New Varieties of Plants.

With the accession to the Convention and the guarantees provided thereby, favorable conditions have been created for the introduction of foreign varieties. The guarantees provided by the Convention have attracted applications for registration in Hungary by foreign companies, and increased their confidence in the cooperation with Hungarian breeders.

Over the last six years, Pioneer has made use of the possibilities provided by plant variety protection. During that period, the National Office of Inventions granted protection to more than 20 Pioneer hybrids and many applications for Pioneer and jointly-owned hybrids are pending.

* * * * *

Pioneer is very glad to express at this Seminar the company's concerns for plant variety protection, the security offered by plant variety protection and the international harmonization promoted by the UPOV Covention.

Pioneer has been in the seed business for 65 years now and has worldwide some 5000 employees. Its annual sales in the seeds of various crops amount to just short of one billion dollars. It is active in some 100 countries around the world, including all countries in Europe except Albania. Pioneer works with many different plant species, maize being by far its number one crop in terms of both research and sales. As with all seed companies, a very important part of the company is the research (basic research and breeding of new inbred lines and hybrids) and the value attributed to it. Pioneer invests every year 60 million dollars in its research programs. There are over 60 breeding stations around the world dealing with the various crops, and with maize specifically. There are close to 700,000 test plots per year, to be compared with the number of commercial varieties registered every year, probably some 20 worldwide. This shows the size of the investment in research necessary to obtain what is in fact a very small number of hybrids in the end. Pionner is also heavily involved in biotechnology for the improvement of the breeding process. Some 50 scientists are currently working on this.

The purpose of all these figures and explanations is to show how much is invested in inbreds, hybrids and varieties, the assets of the company. They are its intellectual property, and it is therefore extremely important for the company that an international protection system is available for its material. In order for the company to have a good return on its investment in research, it is essential that the royalties come in.

The release of Pioneer lines and hybrids to various countries around the world has been going on for many years now in many different forms. Pioneer has started in the United States of America and Canada with seed production and trade, and with plant breeding; 25 years ago, it came overseas outside the North American area, starting with Europe. There is a basic difference of approach to be highlighted in this respect. In the United States of America, all activities, from basic breeding through final sales, including seed production, are carried out exclusively by Pioneer employees. In some of the overseas countries, everything is also under the control of Pioneer. But in many

others, there is no direct control over a large proportion of the seed production for proprietary lines, varieties and hybrids as a result of licensing agreements whereby domestic production is carried out by partners or other groups. This is another justification for an effective protection system at international level. An example at point is Hungary: with Pioneer's partner, the Cereal Research Institute in Szeged, inbreds are being maintained and produced in Hungary. All the seed for the Hungarian market is produced in Hungary, where the main export company for the former socialist countries is also located. In fact, five or six different organizations within the country are involved in the direct handling of Pioneer inbreds, hybrids and varieties.

As already mentioned, in the early days, the private companies in the United States of America used the public lines developed by the universities, so that there was no real need for protection from their side. Gradually, through increased investments, they became able to take over a large proportion of the breeding activities of the universities and thus came up with their own private lines, which necessitated some type of legal protection. Today, Pioneer is one of the few companies in the maize business which have at least one of their proprietary lines in every hybrid they sell. In fact, by far, the majority of the lines appearing today in its hybrids are its proprietary material. This again justifies the need for some kind of international protection.

Another very important point in the joint breeding program between Pioneer and the Cereal Research Institute in Szeged is the transfer of technology. As already mentioned, when the first hybrids were introduced into Hungary and other countries some 10 or 15 years ago, the temptation was to come forward with hybrids that had already been on the market for a few years in the United States of America. Now, since Hungary joined UPOV in 1983, the companies have felt that they could come in with the most recent hybrids, actually to the point that, today, there is sometimes only a one to two years difference between the release of the varieties or hybrids in Hungary and in the United States of America; that delay is mainly attributable to the three years of official testing that are required for hybrids in Hungary.

A particular reason for bringing in the most up-to-date varieties is the knowledge of the fact that competitors are doing that. Competition acts as a spur! Pioneer has an internal committee which decides on a country-by-country basis which hybrids to release for seed production and sale; one of the points that is considered is whether the country is a member of UPOV or not. Although not the most important factor, it does play a role in the final decision.

In conclusion then, these are from a private company's side the advantages of an international plant variety protection system. But one must not forget the most important people, the farmers and the countries involved. Through an effective plant variety protection system they can firstly be assured that the genetic variability is increased because of the distinctness requirement put on new inbreds and hybrids, which decreases the genetic vulnerability, in particular in years with extreme conditions. Secondly, they are assured to benefit from the most modern technology. Technology transfer means in the end higher yields and higher revenues from the internal markets of each individual country.

DISCUSSION

1. Mr. Greengrass underlined the fact that plant variety protection enabled foreign companies to immediately make available their latest technology, particularly in the form of inbred lines and varieties, whereas, in earlier years, they did not want to endanger it and supplied the market with technology that was on the way of being outdated. Similarly, it made the establishment of partnership relations with local companies much easier.

2. Mr. Maenhout asked Mr. Dickey for confirmation of his opinion that what mattered was the availibility of protection, rather than then the type--plant breeders' rights or patents--of protection that was available. He also asked for further coments on the relation between the importance placed by companies and farmers on the DUS requirements, on the one hand, and the access to a broad spectrum of genetic variability.

3. Mr. Greengrass felt that the message conveyed by Mr. Dickey was that the availability of UPOV-type protection in Hungary had been a key factor in the exchange of the latest hybrids with thei partners. He also thought that the availability of protection and the DUS requirements made the hybrids on the market to be necessarily distinct, and therefore tended to eliminate homonyms and synonyms; there was thus truly genetic diversity in the market place.

4. Mr. Dickey confirmed that, whilst he had insisted on an internationally accepted form of protection, he meant specifically the UPOV-type protection with the necessary adjustments to crate an interface with other forms of protection.

5. Mr. Veldhuyzen van Zanten underlined the role played by UPOV in setting internationally accepted standards and practices for uniformity and purity. He noted that the inbred lines which had been produced by the American universities had not been as uniform as the commercial companies would have liked them to be. The same was true for pea and French bean varieties. In the absence of a protection system and of the related standards, one would tend to be easy about quality, with the clients complaining afterwards. In fact, the purity and uniformity of varieties had in general greatly improved due to the applicable regulations and standards.

6. Mr. Urselmann noted that the lecture had centered on hybrids, and that the United States of America, in general, and Spain, in relation to maize, had refused to make hybrid varieties eligible for protection. He asked for comments on this situation.

7. Mr. Greengrass replied that, to his knowledge, the exclusion of hybrids from the US Plant Variety Protection Act was in some ways an accident of history. When the Act was passed in 1970, the US corn seed industry was quite content with the protection offered by keeping the hybrid formulas as trade secrets and also with the freedom experienced in its trading operations; it associated plant variety protection with other regulations such as national listing or compulsory seed certification, and was therefore anxious to keep the plant variety protection system away from the F_1 hybrid maize and sorghum industries.

8. Mr. Greengrass added that philosophies had changed since that time, particularly in relation to the need to protect the inbred lines in the case of maize and sorghum. There had been a debate at the end of the 1960's about the protection of inbred lines. But it was now recognized that when one was growing very large acreages in open fields, there was always a risk of losing the trade secret. Therefore, if the Plant Variety Protection Act were to be amended, there would be much support for eliminating the exclusion of hybrids.

9. Mr. Christensen added that companies in the United States of america had made use of the utility patent system to protect their hybrids, so that there was no legal vacuum in relation to hybrids in that country.

10. Mr. Harvey referred to the statement that the value of the increased productivity from the new varieties exceeded by far the payments that had to be made for those varieties and that, from a national point of view, there was a benefit. He asked for further comments on the benefits for the grower.

11. Mr. Kálmán stated that the figures he had given spoke for themselves. There was a general increase in the yielding ability and in the yield stability, a definite benefit for farmers and the national economy. There had also been major improvements in particular agronomic traits, for example, in the root system, the stiffness of the stalk or the rate of drying down in the filed. Those improvements in fact responded to the demands of the farmers.

12. It was added that, in the framework of a global production system, calculations had been made as from the 1970's to ensure that the benefit from new technologies in the form of new hybrids and in relation to fertilization, weed control, etc. would be shared equally between farmers and technology suppliers. This had been quite profitable for farmers, and, in general, modern varieties had been an important development factor.

13. Mr. Veldhuyzen van Zanten added that the increase in value usually was at least 10 times greater for the farmer than the increase of the value (cost) of the seed. There was a market law whereby the farmer should benefit much more than the seed company, a fact shown by the figures provided by Mr. Desprez. The share of the incremental value returing to the breeder was important for him, but the share of the farmer was not only larger, but also much more important for the acceptability of the technological improvement.

14. Mr. Johannson referred to the fact that it was now intended to provide for a mandatory extension of the plant variety protection system to all genera and species, including those thet were considered to be difficult in terms of the DUS requirements, notably suger beet, an important crop for the so-called former Eastern European countries. The difficulties that had been identified were that there were hardly any useful differences between the varieties. This Seminar had shown that the UPOV system, with its DUS criteria, had contributed to creating genetic variability and distinctness among the varieties for the farmer. The absence of a protection system in accordance with the UPOV system for a particular crop tended to narrow the distances between the varieties; in addition, there was the problem of "submarines" in sugar beets, i.e. the same variety appearing under several names from different breeders. This sort of problems would be eliminated with the UPOV system, whose greater value laid in the fact that it clarified the situation for such crops, even though one might expect some initial difficulties. Mr. Johannson asked Mr. Desprez to comment on this.

15. Mr. Desprez stated that French breeders would agree with sugar beet being covered by the UPOV system. They wondered, however, how the DUS examination should be made. In practice the problem was that there were only a few major breeding programs in the world, and it was relatively easy to control plagiarism. If there was plagiarism, it was not because of the presence or absence of protection, but because of the way in which certain companies operated on the market with their varieties. That problem could be solved by the companies without protection, but protection would surely be welcome as an additional tool to moralize trade.

16. Dr. Fuchs confirmed that sugar beet caused problems because of the limited morphological variation. Nevertheless, it was eligible for protection in Germany, where the characteristics used to determine the value of the varieties for cultivation and use, such as yield and sugar content, were also drawn upon for distinctness purposes. This was not easy because distinctness could not be checked with the same reliability as for the other crops where morphological characteristics that were not as susceptible to environment could be used. There was in fact a large variability in the crop. But there was also a fairly large variability within the varieties which could be narrowed down substantially, and this in turn would make the distinctness examination easier. It was a task for breeders to create more uniform varieties. Dr. Fuchs concluded by observing that the problem was the same in relation to national listing as to plant breeders' rights.

17. Mr. Christensen asked whether representatives of commercial companies present had identified countries which were not members of UPOV but had introduced plant variety protection procedures which, though not being in conformity with the UPOV Convention, had been found useful and effective. He noted that his own company, Dekalb-Pfizer Genetics was protecting varieties in Argentina and considered the Argentinian procedures useful.

18. Mr. Greengrass confirmed that Argentina had a plant variety protection law, but that law had been very much inspired by the UPOV Convention. Most people in Argentina felt that Argentina would benefit enormously from accession to UPOV, and the necessary amendments to the law were in the course of being made. An immediate advantage was in the fact that, at present, the existence of the law and its features were not widely known; once Argentina became a member of UPOV, every interested company would know not only that there was a law, but also what its essential features were. This was a major benefit to be drawn from joining an international system, and a system providing a large degree of harmonization.

19. Mr. Veldhuyzen van Zanten added that, if the question was: "Are there positive examples?" he would put the emphasis on the negative examples. There was a trend based on misunderstandings in many developing countries against plant variety protection. Experience showed that in those countries the quality of plant breeding work remained low and that the policies did not necessarily lead to an improvement of the quality of the varieties or to a profit for the farmer. It was his conviction, and he hoped that his conviction would be shared, that by setting a number of rules which allowed competitive breeding, developing countries would experience major improvements through the development of varieties of their crops which would be adapted to local conditions and would improve local agriculture and horticulture. The negative examples sometimes quoted should be not believed but refuted on the basis of practical experience.

THE EVOLUTION OF THE SITUATION IN THE SOVIET UNION

Statement by

Victor Stepanovitch Shevelukha,
Member of the All-Union Academy of Agricultural Sciences and
Former Deputy Minister for Agriculture of the USSR

Esteemed colleagues,

We would like to take this opportunity to give you some information on the preparation of our law concerning the protection of new plant varieties.

I would like first of all to thank Mr. Greengrass for his visit to Moscow, to the Academy of Agricultural Sciences, where he gave assistance on the legal protection of new plant varieties. His assistance made it possible to us to draft a law which is adjusted to the laws of other countries in this field.

I would now like to say some words on the content of our draft.

It provides for the legal protection of both animals and plant varieties.

In accordance with the plant breeders' rights legislation of other countries, the Soviet draft provides for the following requirements: novelty, distinctness, homogeneity and stability. The authors may be Soviet citizens or foreigners. The legal document which certifies the exclusive right is called "certificate"; another legal document which certifies the authorship of the variety is also issued. The duration of protection is as follows: for varieties of fruit, 20 years from the date of registration; for other plant varieties, 15 years; and, for animal varieties, 30 years. The exclusive right concerning the protection of plant varieties can be transferred by succession. The draft regulation provides for the remuneration of authors for the use of their varieties.

All the provisions which are to be found in the UPOV Model Law have been included into the Soviet draft. The examination and registration of new plant varieties will be carried out by the State Committee for Plant Varieties. Some special organs will carry out the examination and registration of animal breeds.

As far as subject matter of the legal protection is concerned, foreign applicants can make applications in respect of the starting material and other selected materials, in the so-called introductions. The draft, which was handed over to the UPOV Office, has been discussed by the Academy of Agricultural Sciences in the Soviet Union and it will be tabled to the Supreme Soviet in the near future.

For the moment, the breeding of new plant varieties is carried out in 53 institutions in the Soviet Union. The breeding of new animals is carried out in 23 institutions.

The basic breeding method is hybridization, mainly the so-called distant hybridization. Our basic task in the field of plant breeding is the improvement of resistance. The breeding is financed by the State up to 70% and by the institution for the remaining. Our output is in the order of some 600 to 700 new plant varieties per year, which is a very high figure.

We shall, my colleagues and myself, use upon our return to the Soviet Union all the very useful information and remarks which have been made at this Seminar. One of them concerns the effective methods which are used nowadays in the field of plant breeding and biotechnology. The Soviet Union has cooperation agreements with many of countries, in particular with institutions in Hungary, Czechoslovakia, Poland, Romania, the United Kingdom and the United States of America, and we should like to invite the participants to this Seminar to entertain such cooperation with the Soviet Union.

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