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

Nairobi, Kenya, May 28 and 29, 1993

UPOV

International Union for the Protection of New Varieties of Plants

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

**organized by
the International Union for the Protection of New Varieties of Plants
in cooperation with
the Kenya Agricultural Research Institute (KARI)**

Nairobi, Kenya, May 28 and 29, 1993



Geneva 1994

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F O R E W O R D

The International Union for the Protection of New Varieties of Plants (UPOV), in cooperation with the Kenya Agricultural Research Institute (KARI), organized a Seminar on the Nature of and Rationale for the Protection of Plant Varieties under the UPOV Convention in Nairobi, Kenya, on May 28 and 29, 1993. The Seminar was the first of its kind on the African Continent.

The program of the Seminar included a session providing an introduction to and general information on plant variety protection, and a session devoted to applications for and the examination and grant of protection under the UPOV Convention. Further sessions dealt with the practical implications of the exercise of plant breeders' rights and with the seed industry in Africa and the possible impact there of the establishment of systems of plant variety protection conforming with the UPOV Convention.

The Seminar provided the participants and, in particular, government officials who might be involved in the formulation and implementation of policies concerning plant breeders' rights, with an opportunity to appreciate the potential benefits of a plant breeders' rights system based on the UPOV Convention.

The Seminar followed closely upon the holding in Nairobi of the World Congresses of the International Federation of the Seed Trade (FIS) and the International Association of Plant Breeders for the Protection of Plant Varieties (ASSINSEL). It was attended by some 150 participants most of whom came from the English-speaking developing countries of Eastern and Southern Africa, representing a broad range of governmental, scientific, industrial and commercial interests, but with significant representation from the world seed and plant breeding industries, as a result of the juxtaposition of the Seminar with the FIS and ASSINSEL Congresses.

This publication contains the texts of the addresses and presentations given by the speakers together with a summary of discussions and a list of participants.



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

Geneva, September 1994

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WELCOME ADDRESS

by

Mr. Nathaniel K. Arap Tum,
Chairman of the Kenya Agricultural Research Institute (KARI),
and Managing Director of the Kenya Seed Company Limited

Mr. Attorney General of Kenya, The Honorable S. Amos Wako,
Mr. Vice Secretary-General of UPOV, Mr. Barry Greengrass,
Mr. Director of KARI, Dr. Cyrus G. Ndiritu,
Board Member of KARI, Professor Karue,
Mr. President of ASSINSEL, Mr. Bernard Le Buanec,
Distinguished guests,
Ladies and Gentlemen,

It is indeed my great pleasure to welcome all of you to the UPOV meeting in Nairobi starting today. This week has seen a lot of activity within this amphitheater and within and outside Nairobi in different forms. Many of you have not only attended the FIS Congress which ended on May 28 and the ASSINSEL Congress which ended today, but you are now ready to attend the UPOV Seminar. This is over and above the tourist activities, parties and other recreational activities that delegates to the FIS and ASSINSEL Congresses have engaged in during the course of the week. It has been indeed our great pleasure to host all of them in this city of the sun, and having seen what they have seen, having experienced the welcome not only of the weather but also of the people of Kenya, we believe that they will come again. You are welcome to come back.

Mr. Greengrass, who is the Vice Secretary-General of UPOV, will now say a few words prior to inviting the Honorable Attorney General of Kenya, The Honorable Amos Wako, to open the UPOV Seminar on the Nature of and Rationale for the Protection of Plant Varieties under the UPOV Convention. And it is now my pleasure to invite him to do that.

INTRODUCTORY REMARKS

by

Mr. Barry Greengrass, Vice Secretary-General of UPOV,
Geneva, Switzerland

Mr. Attorney General, Sir,
Invited Participants from the English-speaking developing countries of Southern and Eastern Africa,
Official Participants from member States of UPOV,
Representatives of invited organizations,

This Seminar is one of a series of Seminars which have been organized by UPOV in various regions of the world with the objective of providing information on the potential benefit to a country's agricultural development arising from the encouragement given to investment in plant breeding by the adoption of a system of plant breeders' rights. You have already heard that this Seminar in Nairobi has been organized so as to coincide with the World Congresses of the International Federation of the Seed Trade (FIS) and the International Association of Plant Breeders for the Protection of Plant Varieties (ASSINSEL). It is organized by UPOV in cooperation with the Kenya Agricultural Research Institute (KARI), and our thanks are due to its Chairman, Mr. Nathaniel K. Arap Tum, its Director, Dr. Cyrus G. Ndiritu, and Mrs. M. Wabule, Assistant Director, for the assistance that we have received. KARI has made available to us this magnificent venue and provided the administrative support of the organization which was established for the FIS/ASSINSEL Congresses. We have as a result benefitted in administrative matters from the tireless assistance of Mrs. Irene Kagwe.

Plant breeders' rights are one of the forms of intellectual property. You are probably all familiar with the idea of protecting the rights of authors by copyright, of protecting the rights of inventors by patent, and of protecting the rights of traders in their trading name and style by trademarks. The plant breeder's right is a very specialized form of protection directed to protecting the rights of the breeders of new plant varieties. It is very closely associated with agriculture and frequently is administered by ministries concerned with agriculture. However, applications for the grant of plant breeders' rights, the scope of protection under plant breeders' rights, questions of infringement, or remedies for infringement, of plant breeders' rights, appeals against decisions as well, of course, as the preparation of national laws and regulations are the business of lawyers. So we are highly privileged and honored today to have present with us the Chief Legal Officer of Kenya, the Honorable Amos Wako, Attorney General, to welcome us to the Seminar and to formally open it.

OPENING ADDRESS

by

The Attorney General of Kenya,
The Honorable S. Amos Wako, EBS, MP, Nairobi, Kenya

Mr. Chairman of KARI, Mr. Nathaniel K. Arap Tum,
Mr. Vice Secretary-General of UPOV, Mr. Barry Greengrass,
Dr. Cyrus Ndiritu and Professor C.N. Karue,
invited participants designated by the Governments of English-speaking countries in Eastern and Southern Africa,
official participants from UPOV member States,
representatives and members of invited organizations,
Ladies and Gentlemen,

It is indeed a great honor and pleasure for me to be here with you this afternoon for the official opening of this Seminar, jointly organized by the Kenya Agricultural Research Institute (KARI) and the International Union for the Protection of New Varieties of Plants (UPOV). On behalf of the Government of Kenya, I wish warmly to welcome you to Kenya. Kenya is very pleased to play host to the first UPOV Seminar on the Nature of and Rationale for the Protection of Plant Varieties under the UPOV Convention held in Africa. I hope that you will enjoy your stay in Kenya and that after the Seminar you will take advantage of your presence here to visit some of the attractions of the wild life in Kenya.

Mr. Chairman, I understand that many of you at this Seminar have had a very busy week as participants in the Congresses of the International Federation of the Seed Trade (FIS) and of the International Association of Plant Breeders for the Protection of Plant Varieties (ASSINSEL). I also learn that in the course of the week, various aspects of the intellectual property protection of plant varieties and their relevance to the seed and plant breeding industries of the world have already been discussed, and therefore I see this Seminar as a logical but necessary follow-up to focus discussion on the more specific issue of the relevance and importance of the UPOV Convention to the breeders of plant varieties and the protection of their proprietary rights under the Convention. There is no doubt that plant varieties are bred for and adapted to particular agro-ecological conditions. However, their usefulness does not stop at our national frontiers but extends beyond such frontiers to our neighbors. It is therefore proper that issues concerning the introduction and protection of new plant varieties should be discussed at a regional forum of this kind. I am therefore pleased to see at this Seminar participants from neighboring countries and I look forward to their continued regional cooperation in this and other fields of common interest. Also I am particularly glad that this Seminar is being held here in Nairobi at a time when the Government is reviewing the organization, the efficiency and the effectiveness of the seed industry in relation to the country's national food security demands and to regional trade. It is also worthwhile to note that this Seminar is of relevance to our review of the policy and the legal framework supporting our agricultural production. I wish at this juncture to commend you, Mr. Chairman, KARI and the Kenya Seed Company Ltd., for jointly organizing this Seminar with UPOV.

Mr. Chairman, Kenya is a country in which agriculture--which includes horticulture--is of great importance as the mainstay of our economy. Kenya is a leading exporter of tea, coffee, pyrethrum, fresh and conserved vegetables and cut flowers. It is therefore necessary that Kenyan farmers and other farmers in the region maintain, and in fact improve, their position in the competitive world market. To be able to do this they must have available to them the very best and latest plant varieties, including those generated from biotechnological innovations. In this regard, Kenya and other countries in the region must not only encourage their own scientists and innovators, but must also create favorable conditions that will make it possible for scientists and innovators in other countries to make available for exploitation in Kenya and the region their best varieties and their most advanced plant biotechnology products.

It is of interest, however, to note that in Kenya plant breeding is carried out by various organizations in the public and private sectors, namely the Kenya Agricultural Research Institute (KARI), the Universities, the Kenya Forestry Research Institute (KEERI), the Kenya Seed Company Ltd., Kenya Breweries Ltd., to mention but a few.

Plant breeding is expensive and has a long gestation period, which means that the benefits to be gained from an improved variety cannot be expected to compensate quickly for the input resources. This exposes the breeder to exploitation by competitors who may have access to his information and material both during and after the development of a particular plant variety.

The new plant variety is always the fruit of many years of effort and labor by the plant breeder. It is for this reason that not only the innovation of the plant breeder must be protected by law against unfair exploitation, but the plant breeder must also be awarded for his innovativeness, creativity, patience and experience. For this reason, it is appropriate that this Seminar should focus on the question of whether States should grant breeders a form of exclusive right to exploit their newly developed plant varieties in order to provide an opportunity to recover their investment and to encourage them to continue with their inherently long-term efforts to develop new plant varieties.

Mr. Chairman, permit me at this juncture to say a few words about the legislative measures we have taken in Kenya to ensure that the rights of the plant breeders are protected. Kenya enacted the Seed and Plant Varieties Act Chapter 3.2.6 of the Laws of Kenya which became operative on January 1, 1975. The primary objectives of that Act are:

- (a) to confer power to regulate transactions in seeds, including the testing and certification of seeds;
- (b) to establish an Index of names of plant varieties and to impose restrictions on the introduction of new varieties;
- (c) to control the importation of seeds and to prevent injurious cross-pollination;
- (d) to provide for the grant of proprietary rights to persons breeding or discovering new varieties;
- (e) to establish a tribunal to hear appeals and other proceedings.

We may not yet have implemented the Act to the full, but the totality of the legislative measures contained in the Act are intended to protect both the consumer and the seed industry. Let me therefore highlight those provisions of the Act designed to achieve this objective. The Act defines certain of the civil liabilities of the seller to the purchaser. However, to protect the seed industry, the Minister for Agriculture may, under Section 15 of the Act, prevent the importation into Kenya of seeds which, if used as reproductive material in Kenya, will cause deterioration of domestic types of varieties of plants by cross-pollination, physical admixture or other means or seeds which are unsuitable for use in Kenya because they are of a type or variety which has been developed in countries with different climate, different hours of day length or other different conditions.

The Act under Part V makes extensive provisions to protect the proprietary rights of plant breeders with regard to breeding and the discovery of plant varieties of such species or groups as may be designated by the Minister for Agriculture. The period for which a plant breeder may exercise the rights granted under the Act ranges up to twenty-five years, depending on the plant varieties in respect of which the rights are granted. These rights confer on the plant breeder the exclusive right to produce or authorize others to produce propagating material of the variety for commercial purposes to commercialize it and also to export it or stock it for sale or export. The plant breeder whose rights are infringed can seek redress in the courts by means of damages, injunction, account or otherwise. I would like to add that this is what is on the statute books, but it has not yet been implemented. Therefore, it is appropriate that regulations defining the right of the plant breeders are being actively considered by the Minister for Agriculture. They are currently under review and will in due course be promulgated.

Mr. Chairman, these are some of the salient features of the Kenya Seed and Plant Varieties Act. As you may have realized, this Act has been in existence for the past eighteen years and, although revised in 1991, it has not taken into account all recent developments in the international seed industry. It is therefore for this reason, Mr. Chairman, that Kenya attaches utmost importance to this Seminar, as it provides an appropriate forum for the participants to learn from the experiences of one another with a view to making recommendations to revise our laws. The Seminar is also important as it will enable us to learn the benefits of being members of UPOV.

Mr. Chairman, Kenya has developed and continues to develop plant material for its ecologically diverse conditions. One of the top priorities in our development program is to develop the horticultural industry which is fast becoming a leading foreign exchange earner having earned for this country two billion Kenya Shillings in 1992. I wish also to mention that Kenya is the world's leading exporter of statice flowers, commanding 70 percent of the market. New varieties of statice flowers have been developed in the Netherlands and Japan, but Kenya cannot benefit from these because it is not party to a legal institution protecting the interests of the breeders of these varieties. Kenya itself has developed a number of plant varieties but these cannot be effectively protected, and Kenya cannot benefit as it ought to, from their use outside the country. It is only when there are legal arrangements in place to protect the rights of the breeders of plant varieties that the added incentive and motivation to breed more varieties to generate additional finance for such projects will exist. In my view, Mr. Chairman, there can be no doubt whatsoever that Kenya stands to benefit from membership to UPOV.

Kenya is already a member of the World Intellectual Property Organization (WIPO), a specialized agency of the United Nations responsible for the development and promotion of international systems for the protection of intellectual property. Kenya is also a party to the Paris Convention for the Protection of Industrial Property which is primarily concerned with patents and trademarks. Kenya will shortly become a party to the Patent Cooperation Treaty which facilitates the filing of "international" patent applications, and Kenya recently became a party to the Berne Convention for the Protection of Literary and Artistic Works. It should therefore not come as a surprise to you that Kenya is hosting the first UPOV Seminar to be held on the African Continent. I am aware of the discussions between UPOV and several organizations in Kenya which are establishing the formal conditions for Kenya's membership of UPOV. I am also aware of the benefits which will accrue from this relationship.

Mr. Chairman, let me take this opportunity to once again assure you of the Government's commitment to the objectives of UPOV, and the fact that this Seminar is being hosted in Kenya bears testimony to this commitment. The Government will take appropriate measures to accede to the UPOV Convention as soon as the administrative consultations have been completed and finalized. However, Mr. Chairman, permit me, if I may, to make a pertinent observation. While the Government recognizes the important role being played by UPOV to ensure that new plant varieties originating from breeders in member countries are protected from exploitation without their consent and that they are paid appropriate royalties, it is nevertheless significant that the current membership of the Union does not include many members from the developing world and, in particular, Africa. Why should this be so and what should be the reasons for this state of affairs? I hope, Mr. Chairman, that the Seminar will address this issue. On my part, I take this opportunity to appeal to other countries in Africa to accede to the UPOV Convention. This is because Africa's economy is based on agriculture and Africa can be and ought to be a leader in the world in the breeding of plant varieties.

Finally, Mr. Chairman, ladies and gentlemen, it is now my great pleasure to declare the KARI/UPOV Seminar on the Nature of and Rationale for the Protection of Plant Varieties under the UPOV Convention formally open. I wish you very fruitful deliberations and I hope that the results of your deliberations will address some of the problems affecting the seed industry in the developing countries, but in Africa in particular. Thank you.

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

INTRODUCTION TO AND GENERAL INFORMATION ON PLANT VARIETY PROTECTION

THE PROTECTION OF NEW PLANT VARIETIES UNDER THE UPOV CONVENTION

Speaker: Mr. Barry Greengrass, Vice Secretary-General of UPOV,
Geneva, Switzerland

PLANT VARIETY PROTECTION--A BREEDER'S VIEWPOINT

Speaker: Dr. Jon Geadelmann, Research Director, Holdens Foundations
Seeds, Stanton, Iowa, United States of America

Chairman: Mr. Nathaniel K. Arap Tum, Chairman, Kenya Agricultural Research
Institute, Nairobi, Kenya

THE PROTECTION OF NEW VARIETIES UNDER THE UPOV CONVENTION

1. As we all know, man is dependent for most practical purposes upon plants for his food. Plants are directly or indirectly the basis for virtually the whole of the nutrition of animals and men. Plants are also a major source of materials for shelter, clothing, fuel and drugs and, in the case of ornamentals, are responsible for the beautifying of man's environment.

2. Man has long recognized the possibility of selecting amongst plants those which best suited his needs, and this process has been responsible for the progressive domestication of many species. The systematic selection of plants to meet man's needs increased dramatically during the nineteenth century and in the course of the twentieth century has become, with the growth in the science of genetics, a science in its own right.

3. The objective of the plant breeder is to select within a species a type which, when grown under identical conditions to those under which a pre-existing type is grown, provides to an enhanced degree a particular desired characteristic whether this be yield, disease resistance, harvest stability, quality or, in the case of ornamentals, some decorative feature. The economic and aesthetic contribution of plant breeding to the well-being of man is for most purposes unchallenged, and I will not dwell upon it today.

4. How then was the emerging activity of plant breeding organized in countries which are now industrialized, and who was doing it? In the earliest times, selection was performed almost unconsciously by farmers selecting what they considered to be the best types as the seed parents for subsequent sowing. In Europe, in the nineteenth century, such selection was increasingly effected by farmers who took a particular interest in the performance of the crops which they grew and who either derived personal satisfaction, and perhaps economic benefit, from the resulting improvement, or perhaps specialized in the production of superior seed as a feature of their farming businesses. At a later stage, some seed and nursery businesses pursued selection as an incidental activity of their businesses perhaps earning an enhanced profit for a short time by offering improved seed and plant novelties.

5. As the science of plant breeding developed with an increasing understanding of the nature of inheritance, academic institutions became active in the breeding of plants, sometimes but not always, as part of their genetic investigations. Finally, in the present century, as the economic and strategic importance of plant breeding was recognized, governments became directly or indirectly involved and funded plant breeding research and development both in universities and in specialist institutes created for the purpose. As plant breeding became more sophisticated and was conducted on a large scale with the use of increasingly expensive equipment and large areas of land it could no longer be conducted in the major crops as a hobby or incidental activity of a business.

6. The plant breeder whether he were hobby farmer or specialist seedsman, of course, suffered from the great disadvantage that in the absence of some special legal provisions, his variety once released could be freely multiplied by all so that his opportunity to benefit financially from his innovations was extremely constrained. A result was that in many countries practical plant breeding in the major crops of strategic importance was conducted by the State

on the basis that an improved plant variety, if freely released to agriculture, would increase agricultural productivity and ultimately perhaps improve the supply and lower the costs of food or other agricultural end products. Without any question, improvements in plant varieties derived from State activities of this nature have been responsible for much of the improvements in agricultural productivity resulting from plant breeding that we have witnessed in this century.

7. Plant breeding did, of course, continue on a private basis in many countries depending on the particular circumstances of a crop or of the seed or nursery industry in individual countries. In some important crops, the development of F_1 -hybrids provided the breeder with a natural form of exclusivity since he alone knew the identity of the parent lines of his hybrid and sought when possible to maintain control of seed of such parent lines. In some countries in Western Europe, the existence of certification schemes gave the breeder a sufficient degree of exclusivity to enable him to recoup some modest investments in plant breeding in crops, such as small grain cereals. In ornamental crops, the State had less reason to invest in plant breeding and this remained primarily the purview of private industry. However, in all cases where plant breeding was conducted using the resources of private individuals, the question was asked whether it was fair that a plant variety should be freely reproduceable by others after its release into the market place, without any recognition of the role of, or any adequate reward to its breeder.

8. Analogies were drawn with the patent system, where an inventor can acquire exclusive rights in a novel, industrially applicable invention, on condition that he discloses his invention in such a way that knowledge and understanding of his invention can be used by others and provided his invention represents an inventive step forward from the technology that was previously available.

9. The plant breeder, by making his variety available in the market place, similarly makes it accessible to others as a basis for their subsequent improvements. The question was accordingly asked: "Why should plant breeders not have exclusive rights in their varieties in order to encourage them to conduct the socially useful activity of plant breeding and to enable them to secure a return on their investments?"

10. Arguments of this nature had prevailed in the United States of America as early as 1931 and led to the enactment of the United States Plant Patent Law. This provided for the grant of a plant patent to the "inventor" of a novel plant which had been asexually reproduced, was distinct and was non-obvious. The United States plant patent was limited to asexually reproduced species (with the exception of potatoes and jerusalem artichokes) since only in this case was it considered that a plant could be reliably described.

11. It was not until the enactment of the International Convention for the Protection of New Varieties of Plants in December 1961 that the role and contribution of the plant breeder was recognized and reflected in uniform rules for the protection of new varieties of plants of all categories, including asexually and sexually produced varieties, on an international basis.

12. I should perhaps read out the initial recitals that precede the substantive Articles of the Convention and describe its objectives:

"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 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,

"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,

"Anxious to reach an agreement on these principles which other States having the same interests may be able to adhere,

"Have agreed as follows: ..."

And then, of course, there follow the substantive provisions of the Convention.

13. The Convention was supplemented in 1972 and revised texts were agreed in 1978 and 1991, but for most purposes the general principles of the Convention of 1961 are preserved in the revised texts. The 1978 Act of the International Convention for the Protection of New Varieties of Plants ("the 1978 Act") is the Act that is in force for most member States. However, in March 1991, a Diplomatic Conference was held in Geneva which resulted in the unanimous adoption by the member States of UPOV of the new revised 1991 Act of the UPOV Convention ("the 1991 Act"). This new 1991 Act will not come into force until five States have acceded to it and even when it comes into force it will only bind States which have chosen to accede to it. Existing member States will only become bound by the 1991 Act when they have modified their existing laws and deposited an instrument of accession to the new Act. The 1978 Act will be closed to accession by additional member States when the 1991 Act comes into force except that developing countries can continue to accede to the 1978 Act until December 31, 1995.

14. My initial remarks will accordingly be limited to the 1978 Act. This is the Act which binds all existing member States of UPOV, which is the basis of the existing UPOV system of plant variety protection and to which UPOV still expects a number of new member States to adhere in the years immediately ahead.

15. The 1978 Act is, in effect, an agreement between States under which States adhering to the Convention undertake to create a system for the grant of plant breeders' rights, within their domestic laws, in accordance with internationally agreed and uniform principles. Under the 1978 Act, plant breeders' rights are granted in each member State for its own territory. They are not granted on an international basis.

16. The various Acts of the Convention have established the International Union for the Protection of New Varieties of Plants which is known as UPOV (the name "UPOV" is an acronym derived from the French translation of the name of the Union).

17. UPOV is an international intergovernmental organization. This means that its members are States and not private associations or private individuals. UPOV is an independent organization with international legal personality. Its headquarters are in Geneva where it employs its own staff.

18. UPOV cooperates very closely in administrative matters with the World Intellectual Property Organization (WIPO), a specialized agency of the United Nations. The Secretary-General of UPOV is the Director General of WIPO, the

UPOV headquarter is in the same building as WIPO, and UPOV receives a range of support services from WIPO.

The Criteria for Protection

19. The 1978 Act provides a system for the protection of a new plant variety, that is to say, the physical unit of plant material selected by the plant breeder with its set of morphological and physiological characteristics. If a legal right is to be granted in respect of the unit of plant material that constitutes a plant variety and if that right is subsequently to be effectively enforced, the identity of the plant material must be established beyond doubt. When seeking to conclude whether particular plant material constitutes or belongs to a "variety" the classifier must exercise judgment but inevitable elements in making a judgment will always include the extent of its distinctness from other material, its uniformity in the sense that variations from a standard description are within reasonable limits and its stability in the sense that it will retain its distinguishing features from one generation to the next. The 1978 Act accordingly requires in Article 6 that member States adopt the three criteria of distinctness, uniformity (the 1978 Act uses the word "homogeneity") and stability as the technical basis for the protection of plant varieties and adds the further two requirements of commercial novelty and the submission of an acceptable denomination for the variety, a total of five criteria for protection. The technical criteria will be covered in detail by subsequent speakers. I will however deal with novelty, the denomination, and make some general remarks on the subject of distinctness.

20. A variety must be commercially novel to secure protection. Article 6(1)(b) of the 1978 Act provides that the variety must not, prior to the date of application, have been offered for sale or marketed with the agreement of the breeder in the territory of the state where the application in question has been filed. States are, however, given a choice in relation to this provision and are permitted, if they wish, to permit varieties to be offered for sale or marketed in their own territories for a maximum of one year prior to the date of application. In addition, the variety must not have been offered for sale or marketed with the agreement of the breeder in the territory of any other State for longer than six years, in the case of certain woody species, or for four years in the case of all other species. These periods of grace relating to commercialization in other countries, recognize the lengthy nature of trials to ascertain the agronomic value of varieties and enable the breeder to carry out necessary trials before making an application for protection without prejudicing his right to protection.

21. The "novelty" rule of the UPOV Convention must be carefully studied. It is quite unlike the novelty rule of the patent system.

22. In the patent system, novelty can be lost if the invention becomes known or published prior to the patent application. In the UPOV system, novelty can only be lost if the variety is sold or offered for sale prior to the commencement of the various time periods.

23. The novel variety must be given a denomination in accordance with the provisions of Article 13 of the 1978 Act. Article 13 provides that the variety must be designated by a denomination which is destined to be its generic designation and it establishes rules designed to ensure that, in the interests of growers and consumers, this denomination does indeed provide a clear-cut generic designation. Thus the denomination may not consist solely of figures,

except where this is an established practice for designating varieties of a particular species. It must not be liable to mislead or cause confusion concerning the characteristics of the variety or its value or identity and it must, of course, be different from every designation which designates in any UPOV member State another variety of the same species or of a closely related species.

24. The UPOV rule relating to distinctness involves, in particular, certain important questions of general principle. The distinctness rule set out in Article 6(1)(a) of the 1978 Act requires a variety for which protection is sought to be clearly distinguishable, by one or more important characteristics, from any other variety whose existence is a matter of common knowledge at the date of the application. "Important" in this context means "important for the purpose of making a distinction." An "important" characteristic is not one that relates to the economic value of the variety. Under the UPOV Convention, a variety does not have to be better than other varieties in order to secure protection. It must only be clearly different.

25. At first sight, this may seem surprising. The question of the kind of difference that was necessary to justify a grant of protection was carefully discussed by experts prior to the 1961 Diplomatic Conference that established the UPOV Convention. They decided that the "value" of a variety varied too greatly with time and place to be an obligatory requirement for an international system of protection.

26. The most obvious example of a value characteristic is "yield" but it is impractical to attempt to use yield in a plant variety protection system. The characteristics that are used for distinctness must be those that

(i) will enable the varietal identity of a particular crop or sample of seed to be established under the practical circumstances of the seed industry and

(ii) will provide the degree of certainty that will stand up to detailed scrutiny in a court of law.

27. This does not mean that value characteristics are never used in the UPOV system. The UPOV member States have developed detailed recommendations upon the characteristics that are best used to establish distinctness in each species. These recommendations favor characteristics which are least influenced by environment. Value characteristics, for example, disease resistance, maturity and plant height, are included for use in these recommendations when appropriate. New technologies, useful for variety identification and totally independent of environment, will be included as internationally standardized testing methods are established.

28. Accordingly, a variety does not have to be better than other varieties to secure protection under the UPOV system. It need only be different.

29. A comparison with copyright may help you to understand this aspect of the system. An author of a book secures protection whether his book is a good book or a bad book. It is the market place which decides whether it is a good or a bad book. Similarly, the fact that an invention is patented does not mean that it is a valuable invention. In both cases it is not the function of the intellectual property system to pronounce upon the value of the property.

30. It should also be noted that the fact that a book is protected by copyright or that an invention is protected by patent does not mean that the book or invention can be commercialized. A country's law may prohibit the publication of a particular book or an invented product may be subject to a regulatory procedure before it can be commercialized, as in the case, for example, of agrochemical or pharmaceutical products. The UPOV system is similar to other intellectual property systems in this respect. The fact that a variety is protected does not mean that it can be commercialized. In Europe, for example, protected varieties of most agricultural crops must be added to a "national list" based upon "value in cultivation or use" before they can be commercialized.

31. The question of "protection" and "value" may well be examined in many UPOV member States by the same office and the same specialists but the two questions are kept separate.

32. The technical criteria of distinctness, uniformity and stability, and the further criteria of commercial novelty and the establishment of a denomination accordingly represent the standard conditions that must be fulfilled to secure protection for a new plant variety under the laws of UPOV member States. The 1978 Act provides in Article 6(2) that, provided the breeder complies with its necessary formalities, a UPOV member State may not make the grant of protection subject to conditions other than the five conditions described above.

The Scope of Protection

33. Article 5 of the 1978 Act establishes the nature of the rights that member States must as a minimum undertake to grant to breeders. Breeders must as a minimum be given the exclusive right to produce reproductive or vegetative propagating material of their varieties for the purposes of commercial marketing and the exclusive right to offer for sale and market such material of their varieties. The breeder's right is limited to the production and sale of reproductive or vegetative propagating material of his variety. The breeder does not, for instance, in the case of a cereal variety, have the exclusive right to sell grain of that variety, but only seed. It is a question of fact to be established by evidence whether a sale is of seed or grain. A further very important aspect to note here is that, under the 1978 Act, the breeder's exclusive right relates only to production for the purposes of commercial marketing. If production of reproductive material is not for the purpose of the commercial marketing of the material or if such material is not marketed, it is not covered by the breeders' rights so that a farmer, for instance, who produces seed on his own farm for the purposes of resowing on his own farm, can do so freely without obligation to the breeder.

34. The 1978 Act only establishes the minimum scope of the right that States must grant. Member States are expressly permitted, under their own laws, if they so wish, to grant to breeders of a particular genera or species, a more extensive right than that described above, even extending to the marketed product of the variety. In practice, however, few States have availed themselves of this right.

35. Article 5 further provides that any authorization given by the breeder in relation to the production or marketing of his variety may be made subject to such conditions as he may specify. The breeder is thus to be free to decide whether he will exploit his exclusive right by producing and selling all the reproductive or propagating material of his variety that is needed by the

market or whether he will grant licenses to others, perhaps in exchange for a royalty. The practice in individual States varies. In many countries, in relation to species where very large volumes of seed must be produced and sold, and where the ease of keeping their own seed influences the price which farmers will be prepared to pay, the practice of plant breeders is to select the least-cost method of production and distribution. For example, in the case of small grain cereals, in most European countries, licenses are granted very widely to organizations, such as local cooperatives and grain merchants, who provide a wide range of services and supplies to farmers. Organizations of this kind produce seed locally under contract and sell it back to local farmers thus minimizing the cost of transportation. The breeder is content to receive a royalty on each ton of seed which is sold. In the case of more specialized seed production, such as the production of some cross-pollinating species, of hybrid varieties, of high-quality vegetable seed or of new varieties of trees or vines, the practice of the breeder will probably be to control very tightly the production of seed or plants in order to maintain the quality and reputation of his variety. In these cases he may seek his reward directly in the price of the seed. Many different situations exist, however, depending upon the commercial structure of seed and nursery plant distribution in each country and the logistical aspects of the production and distribution of a particular species. The 1978 Act is silent on all these marketing questions. It simply requires of UPOV member States that they permit breeders to specify conditions of licenses for their varieties.

36. Article 5(3) of the 1978 Act contains a truly fundamental principle. It states that the authorization of the breeder shall not be required for the utilization of the variety as an initial source of variation for the purpose of creating other varieties. The only permitted exception to this rule arises when the repeated use of the variety is necessary for the commercial production of another variety. This limited exception relates to the use of an inbred line in the commercial production of seed of a hybrid. The free availability of protected varieties as a germplasm source for other breeders is a fundamental tenet of the 1978 Act and demonstrates that its authors were agriculturalists who were totally aware of the nature of plant breeding and of the manner in which incremental progress is achieved by building upon the progress embodied in existing varieties.

37. The 1978 Act requires States to grant a minimum period of protection of 18 years in the case of vines, forest trees, food trees, and ornamental trees and 15 years in the case of all other species.

38. The 1978 Act does not immediately impose upon its member States the obligation to protect all botanical genera and species. The 1978 Act states that its provisions may, and here I emphasize may, be applied to all botanical genera and species, but it does not require member States to protect all botanical genera and species. What it does require is that member States apply the Convention to a minimum of five genera when first acceding to the UPOV Convention and that, over a period of years, they progressively apply the Convention to a greater number of protected species. Most member States protect all species of economic importance in their countries and, in an increasing number of cases, protect the entire plant kingdom.

39. Article 10 of the 1978 Act includes amongst its provisions one to the effect that the breeder of a protected variety shall forfeit his right if he is no longer in a position to provide the authorities with reproductive or propagating material capable of reproducing the protected variety with its morphological and physiological characteristics as defined when the right was

granted. In other words, the breeder must competently maintain his variety if he wishes to retain the benefit of protection.

40. Article 2 of the 1978 Act provides that a State may provide protection for plant varieties in the form of plant variety protection or of a patent but once it has opted to protect varieties of a species by plant breeders' rights it may not subsequently protect varieties of that same species by patent. This is the so-called prohibition on "double protection." Article 3 of the 1978 Act states that each member State must accord to nationals and residents of other member States the same treatment as far as the recognition and protection of their varieties are concerned as that which it accords to its own nationals.

41. Article 7 of the 1978 Act provides that member States shall only grant protection after the examination of the variety in the light of the criteria of distinctness, uniformity, stability and commercial novelty which I have referred to. This provision has been interpreted to mean that member States should require a growing test which should be conducted either by the State or by the breeder provided that the test follows relevant guidelines and that the breeder is required to supply a sample of the variety at the time of application and to permit persons authorized by the State to visit the trials. Subsequent speakers will address the topic of the examination of varieties in detail.

42. Article 9 of the 1978 Act provides that UPOV member States may not restrict the exercise of the exclusive right accorded to the breeder otherwise than for reasons of public interest and that, where any such restriction is imposed, the member State involved shall take all necessary measures to ensure that the breeder receives equitable remuneration.

43. Article 10 of the 1978 Act provides that the right of the breeder should not

(i) be annulled unless it is shown that the variety did not fulfill the commercial novelty and distinctness requirements when the rights were granted,

(ii) be cancelled unless the breeder fails to maintain the variety or pay the necessary fees.

44. Article 12 of the 1978 Act requires member States to establish rules giving priority for a period of twelve months to an application for a variety where an application has already been filed for that variety in another country. This means that an application in a member State must be treated as if filed on the date of an earlier application in another member State for which priority is claimed.

45. Article 14 of the 1978 Act provides that the grant or refusal of breeders' rights for a variety must be independent from the regulation in any UPOV member State which are concerned with the production, certification and marketing of seeds.

46. Articles 1 to 14 of the 1978 Act are the Articles which establish the main legal rules which the member States of UPOV undertake to incorporate into their national laws. The remaining provisions of the 1978 Act are for the most part concerned with the establishment of UPOV and its management.

47. The period since 1961 has seen a steady growth in the number of States which are members of UPOV. Today [in May 1993], UPOV has the following 23 member States: Australia, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Poland, Slovakia, South Africa, Spain, Sweden, Switzerland, United Kingdom, United States of America. Argentina, Austria, Norway and Uruguay have taken formal steps towards membership but have not yet deposited their instruments of accession.

48. In Europe, Bulgaria, Greece, Portugal, Romania, the Russian Federation, Slovenia, Turkey, and Ukraine have prepared laws or draft laws on the protection of plant varieties, while the European Economic Community is in the process of elaborating a Community Plant Breeder's Right, which will enable the grant, pursuant to a single application filed in a central Community Breeders' Rights Office, of a breeder's right effective in all the twelve member States of the EEC.

49. In Latin America, Argentina and Uruguay have laws which accord with the UPOV Convention while Chile has a law which accords with the UPOV Convention in most respects and has a draft law before its legislature which has the expressed purpose of bringing the law of Chile into conformity with the UPOV Convention.

50. The countries of the Southern Cone of Latin America are studying a draft agreement pursuant to which the countries of the region (Argentina, Brazil, Chile, Paraguay and Uruguay) would agree to protect plant varieties on a harmonized basis which accords with the UPOV Convention. The countries which are party to the Cartagena Agreement (Bolivia, Colombia, Ecuador, Peru and Venezuela) are studying a draft Decision under the Cartagena Agreement which would introduce a subregional system for the protection of plant varieties which would also be consistent with the UPOV Convention.

51. The North American Free Trade Agreement once ratified will require its contracting parties, Mexico, the United States of America and Canada, to become or remain as members of UPOV.

52. In Africa, Kenya has had a plant breeders' rights law in its statute book for many years which has not so far been implemented, while Zimbabwe has a law which is in force and grants titles of protection. Both these laws accord in almost all respects with the UPOV Convention. Morocco has a law at an advanced stage of preparation which will accord with the 1991 Act.

53. We can thus hope to see something in excess of forty countries with laws for the protection of new plant varieties, which conform with the UPOV Convention, within the 1990s. These countries will all have reached a decision to adopt a plant breeders' rights law after detailed and careful consideration of their national circumstances. They will all probably have concluded that plant breeding needs to be conducted in most cases within their national borders if they wish to secure the maximum benefit from the potential offered by plant breeding and that a system of incentives to plant breeders will bring about an increase in the total amount of plant breeding relevant to their territories. Such breeding, being undertaken in programs which are independent from each other, is likely to have diverse breeding objectives and deploy diverse genetic sources.

54. I commend to you the 1978 Act of the Convention which is receiving increasing recognition throughout the world.

55. The question immediately arises: "Why should it be necessary to revise such an excellent Convention and what changes have been incorporated into the new 1991 Act of the Convention?"

56. First, under the system of the 1978 Act, it is possible for breeders to discover that their particular varieties cannot be protected in some countries because the species in question is not protected in that country. The 1991 Act provides for the eventual protection in all UPOV member States of all plant genera and species.

57. Secondly, under the 1978 Act, the breeder's protection enabled him only to control marketing of the reproductive material of his variety and production of such material for the purpose of marketing. A number of difficulties arose with this formulation of the breeder's right. It had the advantage for farmers that the production of seed on their farms for sowing on their farms fell outside the scope of protection but it had the effect also that a person could buy one fruit tree and use it, after propagation, to plant a vast orchard with no obligation to the breeder. The modern techniques of tissue culture multiplies the potential for this kind of misuse of the breeder's variety. The 1991 Act accordingly extends the breeder's protection to all production and reproduction of his variety BUT permits member States on a discretionary basis to except from the breeder's right any traditional form of saving seed on the farm which they wish to retain.

58. Thirdly, under the 1978 Act, a variety can be taken to a country which does not provide protection for new plant varieties and used there to produce an end product, say, cut flowers or fruit, which is exported back to a country where the breeder's variety is protected. The breeder receives no remuneration from the exploitation of his variety in this way. The 1991 Act extends the breeder's protection in very limited circumstances to the harvested material of his variety so as to enable him to seek some reward from the exploitation of his variety in the kind of circumstance described above.

59. Fourthly, under the 1978 Act, a protected variety can be modified in a very limited respect, e.g. by reselection, mutation, the addition of a gene etc., and, provided the modified variety is clearly distinguishable from the protected variety, it can be separately protected without any obligation to the breeder of the protected variety. The 1991 Act provides that varieties that are "essentially derived" from a protected variety in this way can still be protected but cannot be exploited without the permission of the breeder of the protected variety from which they are derived. Varieties are "essentially derived" for this purpose only when they are virtually entirely constructed upon the basis of the protected variety from which they are derived. This provision is designed to discourage parasitical breeding approaches.

60. Fifthly, there is no provision equivalent to Article 2 of the 1978 Act which creates the so-called ban on double protection by patent and breeders' rights. Any State which accedes to the 1991 Act must protect varieties of all plant species under that Act but it may also provide protection by patent as an alternative or additional form of protection if it so wishes.

61. There are other changes in the 1991 Act but the changes to which I have referred are the major substantive changes.

62. I think that the changes which have been made are very desirable and that they will provide plant breeders with a form of protection adapted to the needs of the Twenty-First Century but one which still represents a fair balance between the interests of breeders, farmers, and society at large.

63. I am sure you will wish to know how a State can become a member of UPOV. First, the State must have enacted and be in a position to implement a law on plant variety protection which conforms with the rules established in the particular Act of the UPOV Convention to which it wishes to accede and it must then ask the Council of UPOV to advise it in respect of the conformity of its laws with that Act. If the Council's advice is positive, the State in question must then deposit an instrument of accession to that Act of the Convention (a form of legal document) with UPOV and provide certain information to UPOV including its proposed basis for financial participation. It will become a member of UPOV one month later.

PLANT VARIETY PROTECTION--A BREEDER'S VIEWPOINT

INTRODUCTION

1. I am honored to have this opportunity to share with you some of my views on plant variety protection. My goal is to help "set the stage" for tomorrow's program, which will explore aspects and issues of plant variety protection in greater depth. There is no question in my mind that plant variety protection, or PVP for short, helps to ensure that farmers have a reliable supply of good-quality seed of superior varieties. I will try to explain some of my reasons for this statement. But, like most good things, PVP is not without its risks and limitations, and I will mention some of these, also.

2. My comments here are my own, as a member of the worldwide "plant breeding community." I have been involved in plant breeding for more than twenty years, in both public and private sectors of the seed industry. Most of my experience has been with maize and within the United States of America. I have travelled somewhat, particularly in recent years, and have learned that the problems and opportunities, issues and solutions, tend to be similar in countries I have been privileged to visit. Although most of my views as a plant breeder have been shaped by maize in the United States of America, I think at least some of them are relevant to other crops and other areas.

3. The United States of America has a history of strong involvement of both public and private sectors in plant breeding and in transferring the products of this technology to the farmer. Hybrid maize was born in the United States of America, and the "miracle" of hybrid maize has often been cited as an outstanding contribution of plant breeding. I believe it is important to realize two key facts about hybrid maize: (i) the hybrid concept began as basic, public research in genetics, and (ii) the involvement of private industry made it possible for the hybrid approach to blossom into a "miracle" for the farmer and ultimately the general public. The inherent "biological" plant variety protection provided by hybrids allowed private companies to obtain a return on their research and seed production, etc. investments, which in turn stimulated competition and a reliable supply of high quality seed of superior hybrids to farmers. I firmly believe that, without the involvement of private industry, the "hybrid maize miracle" would never have happened.

4. "Biological" plant variety protection refers to the fact that a hybrid variety (F_1 generation seed) is produced by crossing genetically different parents. Seed produced on the plants grown by the farmer (F_2 generation seed) will be highly variable and will have lost much of the "genetic advantage" and agronomic performance of the F_1 generation seed.

5. Successful breeders of superior plant varieties desire a fair and reasonable financial return on their investment. Privately-funded plant breeders must have this return to remain successful. Publicly-funded plant breeders may find that public recognition of the merits of their varieties is sufficient, if such recognition is accompanied by continued financial support. So, one way or another, the farmer and/or consumer must pay for good seed of superior varieties, with an adequate amount of this payment being invested in further research and development, to ensure future availability of good seed of still better varieties.

6. "Plagiarism" refers to the "act of passing off as one's own the words or ideas of another." Plagiarism is not limited to words or ideas. Increase and sale of a variety by someone other than the breeder/owner, without permission, is an obvious case of variety plagiarism. Less obvious, but not less important, are varieties developed to closely resemble the original variety in all important features, and which are then sold as "new" varieties without permission of the breeder/owner of the original variety.

7. Plagiarism of varieties has sometimes disrupted adequate financial return to and/or public recognition of the breeder's development of new varieties. Plagiarism of varieties is a concern of many breeders. The research cost alone of development of most new varieties is high, probably several hundred thousand US dollars per variety, or more. Companies also invest heavily in seed production, distribution, and marketing of new varieties. Loss of even a fraction of the fair return on these investments due to plagiarism can literally mean the loss of a viable business. In addition, plagiarism acts subjectively to reduce individual and corporate incentive, or enthusiasm, for future development of superior varieties.

8. Plagiarism should not be confused with the use of varieties as genetic source materials for development of new varieties. Most breeders support legitimate access to and reasonable use of their commercial varieties by other breeders to develop new, different varieties. For example, an American Seed Trade Association "majority" opinion statement included the following: "Due to the nature of plant breeding, continued improvements in productivity of crops is dependent on the use of existing varieties and germplasm as building blocks to develop new varieties to meet the challenges and needs of the future" (Schapaugh, 1989). I will assume that "legitimate access" can, in most cases, be defined as obtaining a variety by the normal commercial channels used by farmers. In other words, you go out and buy commercial seed offered for sale to the farmer by the breeder/owner. The issue of legitimate access is more complex than I have defined it, but I think it inappropriate to dwell on that here. In what follows, I am assuming that legitimate access is the case.

9. "Reasonable use" of commercial varieties in breeding research to develop new varieties is therefore the key issue. What constitutes "reasonable use?" I believe most, but not all, breeders agree that use of a commercial variety in the formation of a heterozygous breeding, or source, population would constitute reasonable use, given the clear intent of the "other" breeder is to develop a new, appreciably different, hopefully superior variety. For example, a commercial hybrid variety (e.g., a maize hybrid) could be used (selfed) directly as a breeding source, or it could be crossed with one or more other unrelated varieties or germplasm sources to form a breeding population. A "pure line" variety of a self-pollinated crop species (e.g., wheat, rice, soya bean) could be crossed with other, unrelated varieties or germplasm, to form a breeding population. However, I believe most breeders agree that "close" breeding which intentionally makes only slight changes in a variety is an unreasonable use of their variety, and commercialization of such "new" varieties is plagiarism, is unethical, and should be illegal if done without legitimate access and permission of the breeder/owner. Multiple backcrossing to incorporate one or a few different genes while keeping the great majority of the genotype intact is one example of "close" breeding.

10. To summarize the paragraphs above in a single sentence: My view is that it is OK to own genotypes, but not genes. "Genotypes" refers to developed varieties. "Genes" refers to naturally-occurring genes, not novel, "artificial" genes developed through biotechnology.

11. Given that view, how can a breeder protect his commercial variety, or genotype, from plagiarism? There are two broad ways: (1) biological, and (2) mechanistic/legal. Biological protection is available to breeders of sexually-reproduced crops in which the commercial variety is a hybrid, i.e., the F_1 generation of a cross of two genetically different parents. Naturally cross-pollinated crops, such as maize, offer biological protection, but self-pollinated crops, such as wheat, or asexually-propagated crops, such as some ornamental species, do not.

12. Mechanistic and legal strategies have therefore been developed ("evolved" may be a better term) to provide at least some degree of protection against varietal plagiarism. Jondle (1993) listed five general categories of plant protection currently available in the United States of America: trade secret law, contract law, plant patents for asexually reproduced plants (1930), plant variety protection (PVP, 1970), and utility patents (UP, 1985). Depending on their crop, the nature of their business, their best judgment, and perhaps other factors, each breeder chooses which form(s) of protection is most appropriate. Using maize as an example, many hybrid seed companies choose to protect their parent inbred lines by a combination of trade secret and contract practice and law. They do not apply for PVP or UP protection on their parent lines or the commercial hybrid varieties. My company, Holdens Foundation Seeds, provides seed of parent inbred lines, not hybrids. So, we have chosen to use PVP and UP, in addition to contracts, to gain some protection for our "varieties."

13. However, the law and its use are not static; they evolve through court decisions, new legislation, and interpretation by policy makers. The 1991 revision of the UPOV Convention is one example of such change and evolution in response to the concerns and needs of the seed industry. Possible changes in USDA policy on seed availability of PVP'd varieties is another example that may have major affects on some companies and may change their strategy for protection of varieties.

14. But, I am a plant breeder not a lawyer or a policy maker, and my task here is to present my view of PVP. So, although one must not ignore these other mechanisms of variety protection, I will direct most of my remaining comments to PVP.

15. The United States of America Plant Variety Protection Act of 1970 has unquestionably affected private and public plant breeding in the United States of America during the past 22 years. Coincidentally, 1970 was the year in which I received my Ph.D. in plant breeding, so I can say with some validity that I have "grown up with PVP." In the main, I believe its effects have been favorable, but not always and not to all people.

16. PVP certainly stimulated greater breeding activity in several self-pollinated crops, such as wheat and soya bean, which lack biological protection and had until 1970 lacked legal protection from plagiarism. Robinson (1992) reported that the number of private-sector soya bean breeders in the United States of America increased from two in 1966 to 63 in 1984, and that between 1977 and 1986 the proportion of total soya bean area planted to private varieties tripled, to 86%. Evans (1992) reported a total of 2,794 PVP certificates had been issued as of July 31, 1992. 1,903 or 68% of these were for "agricultural" varieties and 784 or 28% were for "vegetable" varieties. Soya bean (582), wheat (238), and maize (241) received the most (number) PVP certificates of the agricultural crops. The PVP office receives, on average, at least one PVP application every working day.

Effects on Public Breeding

17. In debates prior to the passage of PVPA in the United States of America, some argued that increased private sector breeding encouraged by PVP would lead to reduced support for and activity in public sector applied breeding and shift public funding to basic research (Butler and Marion, 1985). Others said PVP would encourage public breeding because it would allow public breeders, e.g. universities, to protect their varieties and receive royalty payments for their use. There was similar debate about the probable effects of PVP on exchange of information and germplasm.

18. I see no clear effect of PVP on trends in public sector breeding and exchange of information or germplasm. It is difficult to clearly separate PVP from other factors such as general changes in public funding of agricultural research and the rapid growth of biotechnology. I believe there remains strong, but not unanimous, public and private support for public plant breeding. At the University of Minnesota, where I spent 15 enjoyable years as a professor of plant breeding, I know of no plant breeding program which has been cancelled or substantially modified primarily due to PVP.

Effects on Seed Prices

19. Has PVP had a substantial effect on seed prices? Answers to this question, like all issues related to PVP, can vary greatly among crops, areas, etc. Butler and Marion (1985) examined several crops in the United States of America and reported that, while seed prices increased since 1970, the rate of increase was neither high nor low compared with other inputs such as fuel, fertilizer, pesticides, etc. The actual cost of PVP application is quite small relative to the research and development cost of a new variety. My own direct experience has been that PVP did not cause a seed price increase.

Saved Seed Issue

20. So far, I have painted a rather glowing picture of PVP in the United States of America. All is not well, however. Robinson (1992) said it appears that the number of private wheat breeders in the United States of America has dropped dramatically in recent years. A public wheat breeder reportedly said that "if the PVP is not strengthened, or if hybrid wheat does not become commercially viable, by 1996 private wheat breeding for the Great Plains will be non-existent." The main problem is "brown bag" seed, a United States of America term to mean increasing and selling a PVP'd variety without the breeder's permission. Or, in other words, blatant varietal plagiarism. This is a problem which exists in the United States of America to a much greater extent than in other countries, since the Plant Variety Protection Act of my country not only permits a farmer to replant some of his previous year's crop but also permits him to sell some of it as seed. Other UPOV member States do not permit such sales. Many breeders of the United States of America, and the ASTA, support amending the "saved seed provision" of the United States of America PVP Act to limit the use of farmer-increased seed of a PVP'd variety to the farmer's own holdings. Many other breeders favor no saved seed provision at all, and would not allow any increase of a PVP'd variety for seeding purposes.

21. My view is that the reality of farming usually makes enforcement of a ban on farmer use of saved seed on his own holdings impractical if not impossible.

I support the 1991 UPOV Convention which allows a member country to permit farmer's use of saved seed on his own holdings. A total ban on such use, even if accomplished, could generate considerable ill-will toward the breeder on the part of the farmer. Also, farm-saved seed tends to be of inferior quality compared to commercial seed lots, particularly if the seed company is doing a good job of production, storage, and distribution. This inferior quality results in lower yields. Seed companies can compete against farm-saved seed by selling high-quality seed, and the marketplace (the farmer), not the law, will ultimately decide if the superior performance of commercial seed is worth the added cost.

Research Exemption and Essentially Derived Varieties (EDV)

22. Another important part of PVP to the plant breeder is the question: "How different must my variety be from other varieties (of the same species) to qualify for protection?" Present United States of America law allows a variety to qualify for PVP if it differs from other protected varieties in one (or more) heritable characteristics. In other words, if the variety is distinct, uniform, and stable (DUS for short), it can receive PVP. The "research exemption" of PVP law appropriately allows (majority opinion) the use of protected commercially available varieties in breeding. The combination of "distinctness" and the "research exemption" under current PVP in the United States of America can allow a breeder to receive PVP on his "new" variety even if it differed some other breeder's variety in only one minor, commercially unimportant, but measurable characteristic, such as silk color or tassel branch number in maize.

23. Most breeders, including me, believe that the above constitutes varietal plagiarism, and that PVP should be modified. The key issue is to disallow "close" breeding, i.e., the use of a protected variety to intentionally develop without permission a very similar "new" variety, one with essentially the same characteristics of the first, or initial, variety. The 1991 UPOV Convention commendably attempts to resolve the issue by introducing the concept of "essentially derived varieties," or EDV. The guidelines for EDV are still being considered and developed, but are primarily as follows: For a new variety to be considered as essentially derived, at least one variety (the "initial" variety) must have been used in the breeding of the new variety. Further, the new variety must be clearly distinguishable from the initial variety (i.e., distinctness, as in PVP), it must have been predominantly derived from the initial variety, and it must conform to the initial variety in the expression of essential heritable characteristics.

24. I want to emphasize that EDV is not the same as "distinctness" or "minimum distance." Suppose two maize breeders working independently used the same breeding population to initiate development of a new inbred parent line. Both breeders had legitimate access to the population; for example, a population created by selfing a commercial hybrid variety owned by a third, independent breeder. I believe it is highly likely that the "end product" of each breeder's efforts, i.e. the two independently-developed new inbreds, would be quite different from each other, and also from the parent lines of the commercial hybrid variety, i.e., the lines of the third breeder. But, the unusual does happen occasionally, and it is possible that the two new lines, while distinct from each other and from the original parent lines and thus eligible for PVP, may be similar enough to cause concern about varietal plagiarism.

25. The ongoing discussions of guidelines for EDV in order to fairly and reasonably answer such concerns revolve around three key questions:

- (i) What methods of breeding, by their nature or intent of the breeder, should be considered to result in EDV's?
- (ii) What "threshold" value of genetic similarity is appropriate to result in EDV?
- (iii) Which methods of measurement of genetic similarity are appropriate to indicate derivation?

26. These are important questions, each with many "answers," and it will be some time before agreement is reached on the "correct" answers. The ASTA, for example, has had several "variety identification crop committees" working for some months to develop answers to these questions by crop. Some of the committees have reached conclusions. The maize committee, for example, has reached some tentative conclusions. I emphasize that these tentative conclusions have not received approval of the ASTA Board of Directors, and are not the "official" position of the ASTA. I present them here as an example of current thought regarding EDV, and they are generally similar to conclusions of the ASTA cotton and sorghum committees. The ASTA maize committee conclusions are:

- (i) Several methods of breeding could result, by nature or intent, in an EDV.
- (ii) Threshold values should be defined based on that portion of the measurable genome which is not commonly possessed by the stated parents. No EDV if less than 75% similarity; EDV if 90% or greater similarity; and further steps needed if similarity between 75 and 90%.
- (iii) Several methods of measurement would be appropriate for maize, including breeding records and pedigree information, phenotypic measurements of the lines, combining ability, and various biochemical and molecular assay techniques, such as isozymes, RFLPs, and RAPDs. No method in and of itself should be used alone in the determination of essential derivation, or, to show that a variety is not essentially derived.

27. ASSINSEL (1992), in a broader effort, also has had several crop sections and working groups or parties studying concepts and issues related to EDV, PVP, intellectual property, etc. ASTA, as a member of ASSINSEL, has had input into several of these groups.

28. My view of EDV's current status is that the vast majority of breeders, perhaps all, support the concept of EDV. In my experience, most breeders that have so far expressed an opinion appear to support, in general, the kind of "answers" given by the ASTA maize committee. For myself and for maize, I share the ASTA maize committee's view.

29. So, to return to the example of the two maize breeders, and using the ASTA maize committee's opinions as our guide, how would the concern about varietal plagiarism be resolved? My own view is this:

- If the two new lines were less than 75% similar to each other and to either parent line of the source hybrid, there is no essential derivation.

- If either new line were 90% or more similar to one of the parent lines, then the new line would be essentially derived, even though there was no intent to plagiarize by the breeder.
- If the two new lines were 75 to 90% similar to each other, or to one of the parent lines of the source hybrid, then we are in the "gray zone" where "further steps" would be needed to resolve the situation. Hopefully, mechanisms of arbitration can and will be used, with appropriate scientific information and experience, to fairly and promptly settle any disputes.

30. But, I will say again that I believe either of the two events above is unlikely; it is far more likely that both new lines will be quite different from each other and from the two parents of the source hybrid.

Plant Variety Protection (PVP) vs. Official Trials

31. PVP is not the same as, and should not be confused with, "official trials" conducted by government agencies in attempts to measure the commercial level of performance of a new variety relative to current "standard" varieties. Opinion varies widely on the ultimate value of official trials to the farmer and consumer. Some countries appear to firmly believe such trials are of great value. Other countries, such as the United States of America, believe them to be of limited or little value, depending on the crop. My view is, basically, that official trials should be at most a test of the general level of suitable adaptation. Official trials should not attempt to rigorously define the "best" varieties. I believe the marketplace, i.e., most farmers, can and do rather quickly sort out the superior varieties from those available to them, not only in their genetic aspect but also for quality of seed and services offered by the vendor of the variety.

32. In conclusion, as a breeder, I want to know before I start a breeding project that I am using legitimate source material, and that when or if I do develop a new variety from that material I will have full rights to use it and receive a fair and reasonable return on my investment.

33. I support PVP and look forward to correction of at least some of its weaknesses while preserving its strengths. But, in the final analysis, there can be no guarantees against variety plagiarism. It has been said that imitation is the highest form of a compliment. It has also been said that the best defense is a good offense. Organizations, companies, and countries that spend too much time worrying about refining PVP and not enough time in doing good breeding research run a serious risk of falling behind their competition.

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DISCUSSION

1. Mr. Barry GREENGRASS (UPOV) opened this discussion by noting that the Attorney General had by implication asked a question in his address when he noted that the member States of UPOV were all developed countries and asked why this was so. The Attorney General's statement was correct. The first developing country members of UPOV would only emerge during the coming year in Latin America. The reason why there were no developing country members hitherto was because plant variety protection was appropriate in countries which had reasonably developed seed industries and which wished, under their particular circumstances, to encourage the investment of private resources in plant breeding by providing incentives for plant breeders. This situation had existed so far mainly in developed countries. The fact that the FIS and ASSINSEL Congresses had been held in Nairobi during the week was clear evidence that Kenya was a country which was participating in the international seed industry and whose national circumstances were such that it began to be in a position where perhaps it would take the view that plant variety protection could play a useful role in its further agricultural development.
2. It was stated that developing countries were finding that it might be cheaper to carry out adaptive research or reselection work with existing material (say, from International Agricultural Research Centers) rather than to develop new varieties because of the fact that they did not have sufficient trained manpower. The speaker asked whether, when a variety is developed from an indigenous crop or from such existing material, it would attract a royalty.
3. Mr. Greengrass suggested that the question concerned the situation where a breeder makes a selection in some locally existing material. He noted that,

under the UPOV Convention, a plant breeder secures protection for the work that he has done, irrespective of the source of the germplasm. The UPOV philosophy was that he should be entitled to protection provided the resulting variety satisfied the distinctness, uniformity, stability and novelty requirements of the UPOV Convention. Reselections of the kind described by the questionner could certainly be protected under the UPOV Convention.

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

APPLICATION, EXAMINATION AND GRANT OF PROTECTION ON PLANT VARIETY PROTECTION

THE ADMINISTRATION BY GOVERNMENT OF A LAW CONFORMING WITH THE UPOV CONVENTION, FOR THE PROTECTION OF NEW PLANT VARIETIES

Speaker: Mr. John Harvey, Controller, Plant Variety Rights Office,
Cambridge, United Kingdom

THE TECHNICAL CRITERIA FOR THE GRANT OF PROTECTION AND THEIR PRACTICAL APPLICATION

Speaker: Mr. Huib C.H. Ghijsen, Head, Department for Registration
and Plant Breeders' Rights, Wageningen, Netherlands

Chairman: Dr. Matthias W. Oggema, Deputy Director of Agriculture, Ministry
of Agriculture, Nairobi, Kenya

THE ADMINISTRATION BY GOVERNMENT OF A LAW
CONFORMING WITH THE UPOV CONVENTION,
FOR THE PROTECTION OF NEW PLANT VARIETIES

1. Mr. Chairman, Ladies and Gentleman, good morning. It is a real privilege for me to be present at this Seminar, let alone being asked to participate in it directly. My subject is Administration. Now many of you may think that this is a dull subject. It does not have the glamour of the technical and scientific inputs into the Plant Breeders' Rights system. You would be right. But I hope to convince you today that it is certainly as important as other functions, and it can certainly be argued that it is the most important of all the PBR activities. Why do I say that? There are many reasons, but I will mention only three here in the time I have available.

2. First, plant breeder's right is a legal right granted by the National Office and enforceable through the Courts. It is therefore vitally important for the office to get it right. Second, PBR is not only about the granting of rights--it is also about the refusal to grant rights. In this case the refusal can also be challenged in the Courts and it is equally important to make the right decision. Third, the decision on whether to grant or refuse a PBR will affect the applicant directly, but it may also affect a third party consequentially. It may be a third party whose variety and therefore business would be adversely affected by a grant of rights, or it may be a third party whose business would improve as a result of a rejection and who would contest any appeal by the applicant against the rejection.

3. All of these examples have a common theme, and this is that we are dealing with a legal right which confers certain privileges on the owner of the right. I cannot stress too much the importance of getting the decision right when, in every single case, that decision can be challenged through the Courts.

4. Having set the scene, I want to explain the basic tasks of an office administering a plant breeders' rights system, and to persuade you that these tasks do not require a large number of staff, or expensive equipment. In saying that, perhaps the United Kingdom Office is not a good example. We administer not only plant breeders' rights, but also a European Community system of variety registration. But there are many examples of offices dealing with a small number of applications run with two or three staff. I will come back to this point.

5. It may help if I give a brief outline of the basic tasks performed by the office, and here I refer to the legal and administrative tasks--not the technical DUS testing. I would, however, stress the need for close cooperation between those handling the legal aspects and those doing the technical work, unless--which is quite possible--the same people undertake both functions.

6. I will divide Administration into three sections:

- (a) Legal,
- (b) Administrative,
- (c) Financial.

In doing so, I realize that they can overlap but it is a rational means of dividing the subject.

7. I have already said that we are dealing with a legal right created by national legislation. There are occasions, sometimes frequent, when professional legal advice will be necessary. Sometimes that legal advice will be specific to Plant Breeders' Rights--sometimes it will be wider. For example, if a variety has been advertised for sale prior to an application being received, does this amount to being offered for sale even if no seed of the variety is yet available? The office will at least need access to legal advice. This is the case in the United Kingdom where we use the central Legal Department of our Ministry of Agriculture. Other countries have legally qualified people as part of the office, e.g. Germany and the Netherlands. This is not an issue on which UPOV rules apply. It is for each member State to arrange its own system. The choice would be yours.

8. On Administration, it is sensible to start with an Application. The date of receipt is vital. It establishes the priority of the application. There may be circumstances where two applicants enter what turn out to be indistinguishable varieties. In such cases it is the first application which would be granted rights. The validity of the application has to be checked. Is the applicant the rightful owner of the variety? If he has declared that he is the breeder this can be provisionally accepted. If he is not, he must have an assignment of the ownership from the breeder. The novelty requirement has to be checked. Under the revised Convention, the variety must not have been sold in the country of application for more than one year (or four or six years in respect of other countries, depending on the species). Again, this is covered in a statutory declaration.

9. The office must be as satisfied as is reasonably possible that the declarations are accurate and honest. This is assisted by the publication of the details of the application and giving others the opportunity to make representations about it.

10. Publication is an important factor in the Plant Breeders' Rights system. The office is granting a valuable right, and as I said at the beginning, it is important to make the right decision. So it is necessary to advertise the fact that an application has been made, and by whom, in order that another party can challenge the application or bring relevant information to the attention of the office. Similarly, once all the technical and legal requirements have been checked, it is necessary to publish the proposal to grant the right, and to give third parties an opportunity to appeal against it. Once this process has been completed, the grant of rights can be issued, normally in the form of a certificate. This system helps the office to get it right and reduces the possibility of challenging the final decision. In the United Kingdom, we issue a monthly gazette.

11. A further important function is the approval of the variety name. It is necessary to ensure that the name chosen is not liable to confuse or mislead the purchaser. This is done by the office examining the name submitted by the breeder and satisfying itself that it is appropriate. The name is also published so that others can object if they have grounds to do so. The fact that offices and authorities in other countries can also comment ensures that there is a reduced risk of confusion when material of protected varieties is exported from one country to another.

12. The office must maintain a register containing details of all the grants of rights issued, including details of the variety with a description, and the name and address of the holder. It is also important to record when the rights are due for renewal and when they expire, and to have a system of reminding the holder when fees are due. None of this is very complicated, but as the system

grows the need for sound office procedures and good organization becomes apparent.

13. These then are the broad administrative requirements for running a national Plant Breeders' Rights Office. I am sure you will all recognize most of what I have said as being part and parcel of running any of your normal national offices. What does it amount to in terms of the size and cost of the office. In my opinion, there are two factors which largely determine the size of an office:

- (a) whether the office is part of a Government Department or whether it stands alone;
- (b) how much work it has to do.

14. The first factor is important in terms of the central facilities available to an office from within a Government Department. If it is possible to call upon legal advice, to use central financial arrangements and advice, to use office facilities available within the Department and central services like typing, printing, etc., the size and cost of the office can be very small. In the United Kingdom, I am a hybrid. I do have access to central legal and financial advice, but my office is physically separated from the Ministry. I therefore have to arrange my own services like typing and printing.

15. The second factor is really self-evident. In the United Kingdom, we receive some 500 applications per year. We are not the largest office. But many offices receive less than 100. It may help you if I compare the size and structure of offices required by these different demands. With the kind assistance of the offices concerned I have looked at the way three other offices in addition to my own organize their business. We shall therefore look at the offices in France, New Zealand, Switzerland and the United Kingdom.

1991

<u>Country</u>	<u>Applications</u>	<u>Staff</u>
France	876	5
United Kingdom	446	5
Switzerland	91	1
New Zealand	91	1 1/2

16. Some explanation is needed. First, these staff figures only represent office staff; they exclude all technical staff.

17. Second, the office in France is a separate office but shares certain common functions. It is therefore broadly similar to the United Kingdom position. It operates a computerized system.

18. Third, the office in Switzerland is able to call upon legal assistance. In addition, most of their applications are made by breeders in other UPOV countries so they have little checking of names to do and most of the varieties are tested in other countries. The New Zealand office is part of the New Zealand Ministry of Commerce but is quite independent and self-sufficient. It has a Director and one part-time administrative assistant.

19. You will see from this that no two offices are alike and that their size is largely determined by the two factors I have mentioned. What is certain, is that the UPOV system does not require a large bureaucracy. This is particularly evident in the case of New Zealand, which is a new UPOV member State starting from a relatively small beginning.

20. I hope from the above that I have been able to persuade you that running a PBR Office is not such a daunting task. I would also make the point that the UPOV Office can provide an enormous amount of assistance in the form of a model law, model gazette, and other draft material. Equally, both before a country joins UPOV and afterwards, you can certainly look forward to receiving a great deal of support from other member States. The international world of plant breeding may be small and dispersed but it is one of the friendliest and most co-operative industries I have ever had the pleasure of working in. I and my staff in the United Kingdom Office would be very happy to build upon the work of this Seminar by providing as much direct practical advice and training as we possibly can. Do feel free to ask.

21. I thank you once again for your welcome, and I look forward to the time when we can welcome you into the UPOV community.

THE TECHNICAL CRITERIA FOR THE GRANT OF PROTECTION AND THEIR PRACTICAL APPLICATION

1. This paper will focus its attention on the DUS (Distinctness, Uniformity, Stability) criteria and the way the DUS testing has to be carried out.

DUS

2. According to Articles 7, 8 and 9 of the 1991 UPOV Convention a new variety shall be clearly distinguishable of any other variety whose existence is a matter of common knowledge and it shall be sufficiently uniform and stable in all its relevant characteristics.

Tests

3. The best way of establishing these criteria is in grow-out tests. This means observing the variety in its relevant morphological and physiological characteristics in comparison with similar or reference varieties.

Environmental Variation

4. As we deal with living material, the expression of characteristics can vary under the influence of the environmental conditions. This has two consequences:

(i) The scale of expression has to be calibrated by example or reference varieties.

(ii) The variety under test and the reference varieties have to be grown under uniform conditions in the same trial.

UPOV Test Guidelines

5. In order to harmonize the testing methods and to guide the crops experts in their work, the UPOV Test Guidelines perform an important task. They contain practical indications about trial layout and a descriptive list of characteristics. For each expression of a characteristic one or more example varieties are mentioned. At this moment there are Guidelines ready or in preparation for 195 species.

Trial Size

6. In the case of some important species, with many varieties, it would require much trial space and labor to incorporate all relevant reference, example and similar varieties. However, in many cases it is possible to group varieties according to a clear and dominant character (e.g. flower color in ornamentals) and then to reduce the number of reference varieties which it is necessary to grow.

7. Once sufficient experience of working with a particular species has been acquired, many example varieties can be omitted. It is, however, advisable to have a fixed minimum set of reference varieties present in all trials. For instance, those varieties that form the borderlines of groups.

Breeder Testing

8. In order to save costs and time, breeders' DUS results could be included for the decision taking.

9. At a recent UPOV meeting at Geneva, a small guideline with four recommendations was established setting out the minimum criteria which must be satisfied when a member State of UPOV accepts data derived from breeder testing:

- (i) The growing tests and other necessary tests are conducted according to Test Guidelines established or accepted by the authority.
- (ii) The testing arrangement is maintained--in order to permit the checking of data or the collecting of further data--until a decision has been made on the application or until the authority has informed the breeder that the arrangement is no longer necessary.
- (iii) Access to the tests by persons properly authorized by the authority is provided.
- (iv) The breeder, when requested to do so, deposits in a designated place, and within a time limit set by the authority, a sample of propagating material representing the variety.

10. Breeders' results and/or variety descriptions could be used in several ways:

- (i) Feeding the description into a data base and comparing it with other existing descriptions without controlling the way of testing.
- (ii) Same as (i) but with visits to the testing facilities.
- (iii) Using it as a useful preparation for a central official test.

11. It is dependent of the number of varieties per species, the propagation system and the degree of freedom from the impact of environmental factors which system suits best.

12. For some crops (e.g. tomatoes), many varieties are very similar and it is impossible to distinguish candidate varieties from existing varieties by breeders' descriptions alone.

13. In some special situations, as in New Zealand for instance, where a limited number of cereal breeders work only a short distance from each other, the crop expert can distinguish the varieties by visiting the breeders' trials at different locations. The New Zealand ryegrass varieties, however, are tested on one central trial field.

The Method of Propagation

14. Generally vegetatively propagated and self-fertilizing crops are easier to test than outbreeding species. The latter need more seasons and sometimes more locations to overcome the genotype-environment interactions. The outbreeding varieties consist of a number of different but related genotypes. The test results (measurements) have to be statistically processed. The description is based on an abstract 'average plant' with a limited variation. Within UPOV statistical packages to compute the Distinctness (COYD) and Uniformity (COYU) suitable for PC's have been developed and are available on request.

Reporting

15. After one, two and sometimes three recording seasons, the results are collected and a report is made according to a UPOV format. This includes a comparison with a most similar variety. The aim of this UPOV format is to facilitate the international exchange of reports.

16. If the tests are carried out according to the Guidelines, countries can easily exchange their reports in order to avoid extra work and costs.

Cooperation in Testing

17. It is also possible to delegate or subcontract the DUS testing of varieties to the authorities to another country. This is usually done by bilateral agreements in which the technical and legal procedures are regulated.

Use of the DUS Test Results

18. The descriptions of a new variety that result from the DUS testing are used to grant Plant Breeders' Rights. However, the precise and accurate description that results from the DUS test has other uses in the seed or plant industries. It provides a basis for the elimination of synonyms (same variety sold under different names) and homonyms (different varieties sold under the same name). Therefore, in the EEC, the admission of agricultural and vegetable varieties to value in cultivation and use trials ("VCU") and ultimately to national lists and the EEC list requires that such varieties be shown to be distinct from other known varieties in a DUS test based on UPOV principles.

Skills and Systems for DUS Testing

19. If there exists already a certification scheme in any crop with some kind of post-control work, it will be not too difficult to extend the work to DUS testing. If this work has to be started from scratch, breeders premises should be used in the beginning. For the crops that are only produced for re-export, where no local breeders activities exist, reports can be bought from other countries. For minor species where few applications are anticipated, varieties can be tested by other countries where more applications for that crop are made.

Conclusion

20. Using UPOV recommendations and Test Guidelines for DUS testing will give international exchangeable reports which will enhance the area of protection of varieties in order to stimulate the activities of breeders, big and small. The development of national skills in DUS work will contribute to the establishment of the skill base essential for effective certification of the genetic identity of seeds and plants.

DISCUSSION

1. Mr. Stephen MULIOKELA (Zambia) asked for information concerning the magnitude of fees for DUS tests and annual renewal.

2. Mr. John HARVEY (United Kingdom) explained that the magnitude of the fees depended on the species. There was no single answer. The United Kingdom always charged an application fee and usually charged a fee for a DUS test which varied between 200 and 500 Pounds, depending on the species. It was for each country to decide on its own account whether it charged a fee at all and, if so, what. There was an argument that, because you are granting a right of value, the grant should have a price attached to it. Most UPOV member States made a charge for their services but there was no need to make a charge if a country's agriculture could not afford it.

3. Mr. L.O. SESE (Kenya Industrial Property Office) asked first whether someone who wished to have his variety protected in one country had to file his application in that country or could he apply directly to his home office. Secondly, he asked whether there was any system of appeal from decisions of the Controller of the Plant Variety Rights Office, and thirdly, he wished to know whether plants were protected by the United Kingdom patent law.

4. In relation to the first question, Mr. HARVEY noted that applications must be filed in each State where a breeder desires to receive protection. The United Kingdom, however, received many applications from foreign breeders and he explained that, where the variety was under test in another UPOV member State, the Office generally used the test results of that other country. Within UPOV, there were extremely useful arrangements whereby member States of UPOV could agree, under bilateral arrangements, to accept the tests of other member States or to do testing on behalf of other member States. These arrangements saved expenses and time and were beneficial to applicants.

5. In relation to the powers of the Controller, Mr. HARVEY stated that, in accordance with the law, the Controller settled the operational system of the Office. After providing the applicant and other interested parties with the opportunity to make representations, he formally decided whether or not to grant plant breeders' rights. The applicant could make representations to the Controller in an informal proceeding, if necessary. The decisions of the Controller could be appealed to the Plant Breeders' Rights Tribunal which is made up of specialists and is chaired by a senior lawyer. He noted that most appeals against decisions stopped at the Tribunal stage and he knew of no case which had gone to the High Court in the United Kingdom.

6. The Patent Law of the United Kingdom did not allow the patenting of a plant variety, and the situation was the same in all of the European countries which were parties to the European Patent Convention, which also did not permit

the patenting of a plant variety. A biotechnological invention involving plant material would frequently be patentable. That patentable invention could be inserted in a variety, but the variety, as such, would be protected by plant breeders' rights. That was the way that the system worked throughout Europe.

7. Dr. Cyrus G. NDIRITU (Chairman) emphasized that there were two further criteria for protection which had not been described in Mr. Ghijsen's presentation. These were the denomination and novelty. He commented that participants had heard about DUS techniques and the requirements for laboratories, personnel, etc. These requirements explained why Kenya had had problems for many years when considering the implementation of plant breeders' rights. He thought, however, that Kenya now had many of the necessary structures, and that was why Kenya was now considering implementing the law and administering it in the way described by the speaker.

8. Mr. ODONGO ((NARC Kitale) expressed strong support for the granting to plant breeders of exclusive rights in the varieties that they had developed in order to encourage them in their work and to earn them a secure return on their investments. He asked what were the criteria for establishing the time period for the validity of a grant of protection and whether it was based on the value of the variety in the market.

9. Mr. GHIJSEN (Netherlands) explained that the question had legal and technical aspects. The technical aspect was that the time for breeding woody crops and potatoes is quite long so that these crops have a five-year longer period than other crops. The system of testing, multiplying and introducing these species also takes many years so that breeders of these species get some extra years of protection. Since the annual fees for keeping a variety under protection cost money and if a variety did not yield income, it was senseless to keep it under protection. In practice, the period that a variety was protected depended upon its success. The minimum periods of protection were recently lengthened under the 1991 Act of the UPOV Convention by five years. The times of protection had been chosen to give breeders a good guarantee that they would be rewarded for their investments. The period of protection is fixed for each species and it is not based upon the value of the particular variety.

10. Mr. MWALE (Ministry of Agriculture, Zambia) asked what happens if a variety is called by one name in one country and by a different name in another country. He also asked if a breeder discovers a mutant in a field, to whom does the right go? To the breeder of the original variety or to the discoverer of the mutant variety?

11. Mr. GHIJSEN stated that differing names in different countries could constitute a problem and that varieties were from time to time sold under different names, so-called synonyms. This problem had existed within the European Communities, especially in relation to old varieties, but the rules of the UPOV system tried to avoid it. However, sometimes, for one reason or another, a name accepted in one country could not be accepted in another country, perhaps for language reasons, and then a synonym was necessary and was accepted even under the UPOV rules.

12. The second question relating to mutations was especially relevant to ornamental crops and fruit crops where mutants were sometimes found by growers. In the flower industry, there were often contracts between the breeder and the grower whereby, if the grower found a mutant, he was required to report it to the breeder and, in many cases, they shared the benefit 50 : 50. Usually, the

growers were not interested to market the mutants because they did not have the necessary organization. With fruit trees, there had been several examples of growers finding mutants in good new apple varieties and applying for plant breeders' rights for them. Some big growers had been quite successful in marketing such mutant varieties. This situation was addressed by the dependency rule introduced in the 1991 Act of the UPOV Convention.

13. Mr. MWALE further asked what happened where two varieties were bred in two different countries with the same parents and the same plant genetic constitution, i.e. they were simultaneously bred in both places. To whom did the right then go?

14. Mr. GHIJSEN noted that this was a legal matter which is settled on a first-come first-served basis. The first applicant has the priority.

15. Mr. GREENGRASS (UPOV) further explained that, if two breeders in different countries developed identical varieties independently, the situation would be governed by the priority rules in the UPOV Convention. If, for example, a person in Kenya filed an application today (assuming that the Kenyan law was already in force) and another person filed an application in six months' time in Germany for the same variety, and the breeder from Kenya filed an application in Germany nine months after his application in Kenya, then, provided Kenya was a member State of UPOV when he filed that application, he could make a claim for priority. The application by the Kenyan in Germany, although it was filed later, would then be treated as if it was filed on the same date as the original application in Kenya. The application by the Kenyan in Germany would thus be accorded "priority" in Germany over the earlier German application.

16. Mr. David GRAY (Kenya) noted that it had been suggested that a "breeder" of alstroemeria in Kenya could develop the variety there and apply for plant breeders' rights in Germany, the Netherlands and elsewhere and presumably in all UPOV member States, notwithstanding that Kenya did not belong to UPOV. A Dutch breeder, however, could not apply for breeders' rights in Kenya, because Kenya did not belong to UPOV. He asked if this was an equitable situation.

17. Mr. GHIJSEN in reply noted the encouraging words that had been heard about the future intention to create a system of plant breeders' rights in Kenya. He had chosen alstroemeria as an example for DUS purposes because it was known that some Dutch breeders were very interested in having plant breeders' rights in countries which were producing cut flowers. It was not true, however, that the Kenyan breeder of Mr. Gray's question could apply for protection in all UPOV member States. Most UPOV member States reserved that privilege for nationals and residents of other UPOV member States. Only the United Kingdom granted protection to citizens of non-UPOV member States.

18. Mr. David GRAY suggested that, when Kenya joined UPOV, it could not be assumed that it would immediately test all plant species. His understanding was that, when, for example, the United Kingdom, introduced plant breeders' rights, they were introduced species by species over a long period because you could not introduce protection for all species at the same time. Should the Kenyan Government introduce protection based upon the importance of crops to the country, upon the ease of their testing or upon the sensitivities of export industries?

19. Mr. GHIJSEN replied that a testing system had already been introduced in Kenya some three years ago and was located at Nakuru. He had been there, and they were already testing maize and some cereal varieties efficiently and also on a very small scale beans and sunflowers, so that a technical basis already existed in Kenya. He would not recommend starting too quickly to test cross-pollinating crops because they needed much more knowledge and equipment. The vegetatively propagated species, like the ornamentals, were very good to start with because they were quite simple. You only needed a limited number of plants so that the size of the trial was limited and the observations could be made quite easily. If Kenya followed his suggestion, it could combine the export sensitive crops with the relatively easy crops.

20. Mr. HARVEY commented that many interests were involved. His advice would be to concentrate on those things that were important for the country concerned.

21. Mr. ODONGO asked whether two varieties which were morphologically indistinguishable but which could be distinguished chemically by the use of electrophoresis should be considered distinct or whether the breeder should throw one away and develop the other.

22. Mr. GHIJSEN referred to rare cases where wheat varieties were not morphologically distinguishable and where electrophoresis had been used, for example in Germany, to distinguish them. The UPOV Test Guidelines constituted "recommendations," so that member States were not forced to use them, although they were expected to do so. Where a Test Guideline contained a characteristic, it should be used. Countries were, however, free to use additional characteristics so that some countries used electrophoresis while other countries, for policy or financial reasons, did not. At the most recent UPOV Cereal Subgroup Meeting, it had been agreed, in principle, that electrophoresis should be used in cereals only in a genetically based system under which a band was acceptable as a characteristic if it corresponded to an allele expression at a defined gene locus. Sometimes, electrophoretic patterns were difficult to read and it was important to be sure that they could be reproduced consistently. The inclusion of electrophoresis in the cereal Test Guidelines as a characteristic represented the first formal acceptance by UPOV member States of electrophoresis. However, if enough good characteristics existed in a species without the use of electrophoresis, it was not necessary.

23. Mr. Gisbert KLEY (Germany) reverted to the earlier question concerning the time scale for the introduction of protection for species. It was possible for the National Offices either to share the task of testing species or, for instance, to buy the DUS trial results from other member States and thus be in a position to protect more species more quickly. Agreements of this kind worked well.

24. Mr. GHIJSEN agreed that there could be an exchange of test reports if, possibly because of the cost of maintaining a reference collection, a country did not wish to test a crop itself. It was very cost-effective to buy reports from other countries under bilateral arrangements.

25. Mr. GHIJSEN was asked whether it would be necessary to have the permission of the breeder of an alstroemeria variety in order to use it as a parent for breeding a new variety.

26. Mr. GHIJSEN replied that any variety could be used as a parent under the so-called "breeder's exemption" principle. This was not the case, however, where a variety must be repeatedly used, for example, as an inbred line to make a hybrid.

27. Dr. NDIRITU summarized by saying that participants who may be thinking of promoting plant breeders' rights in their countries had had very good presentations. Many issues had been raised and many of them had been resolved. It was for the African participants to consider the pros and cons of plant breeders' rights in their countries. He thought that if one considered the legal aspects that had been discussed on the previous day and the technical aspects which had just been described, that African countries did not need to be afraid, as they had been for so many years, about plant breeders' rights. In practice, all African countries had something to protect, and with the imminence of so much new technology, the countries should consider plant breeders' rights as a very important tool to be enacted into their national laws.

T H I R D S E S S I O N

PLANT BREEDERS RIGHTS--SOME PRACTICAL QUESTIONS ON PLANT VARIETY PROTECTION

HOW ARE PLANT BREEDERS' RIGHTS EXERCISED BY PLANT BREEDERS?

Speaker: Dr. Gisbert Kley, Managing Director, Deutsche Saatgutveredelung (DSV), Lippstadt, Germany

PUBLIC AND PRIVATE PLANT BREEDING AND PLANT BREEDERS' RIGHTS

Speaker: Mr. Jeremy Davis, PBI Cambridge Limited, Cambridge, United Kingdom

Chairman: Dr. Cyrus G. Ndiritu, Director, Kenya Agricultural Research Institute, Nairobi, Kenya

HOW ARE PLANT BREEDERS' RIGHTS EXERCISED BY PLANT BREEDERS?

1. Plant breeders' rights do not constitute public law whose exercise is guaranteed by the State and enforced with the authority of the State, but private law that the owner of the plant breeders' rights, that is to say the breeder himself, must manage and assert.
2. Plant breeders' rights constitute a right of defense enabling the breeder to prevent misuse of his protected variety. On the other hand, however, they are also the basis for commercial utilization of a variety in an economic system where the tasks are shared. Just as a property right limited in time, they constitute the basis for exclusive or simple licenses for the production and/or marketing of seed of the protected variety.
3. When exercising his rights, the owner is basically reliant on general acceptance of his legal position and of the content of his rights. If he were to be obliged to assert his rights in every single case before the courts and have recourse to enforcement, he would find himself in an impossible situation both from the point of view of work and of law.
4. Additionally, the fact that the use of varieties and of seed take place outside in nature or in an open landscape, permanent control machinery would be most difficult to maintain.
5. These problems, together with the fact that--from a worldwide point of view--plant breeding firms are relatively small when compared with other industries, have led in practice to breeders grouping together within organizations that manage their rights on the instructions of the variety owners.
6. A plant variety has its origin in the intellectually creative act of a plant breeder. This is the justification for protecting the intellectual property in the variety and is the starting point for the exclusive right belonging to the owner or the breeder:
 - to produce and commercially market seed or plant material of his protected variety.
7. The breeder may transfer these activities to other firms, known as seed production firms or seed trading firms, and require from them remuneration, a compensation, for delegating those rights (licensing) in monetary form.
8. In business practice, the following systems have developed for implementing breeders' rights:
9. The breeder or owner of plant breeders' rights carries out seed production and seed marketing himself.
10. In such cases, there is no licensing to other firms.
11. The licensing fee which the breeder plans is an internal element of calculation as an integral part of the selling price for the seed that he has produced from his protected variety.
12. This system is mostly applied for species that have a relatively high rate of propagation, i.e. for which extensive surfaces are not required for

each quantity of seed produced and/or for those species whose propagation demands relatively high technical know-how.

13. The following examples may be given:

- Grass and clover species for which, for technical reasons, seed production generally occurs in regions other than those of seed consumption;
- fine grained crucifers, for example oilseed rape, that have a particularly high propagation rate.

14. Vegetable and ornamental species whose seed can be produced in glass-houses for technical reasons of insulation and due to the high propagation rates.

15. Finally, this system, under which the breeders themselves carry out the production and marketing of seed, is frequently used in the case of hybrids where the breeder is unwilling to relinquish the protected or, in particular, unprotected inbred lines (vegetable species, sugar beet).

16. A different system is generally used for those species that do not have a high rate of propagation and where the seed price for each weight unit is not high enough to economically justify long-distance transport and where the area of seed production and consumption is the same.

17. This applies, for example, to potato seedlings, to cereals species such as wheat or barley, to coarse legumes such as field beans, fodder peas or soya beans.

18. In such cases, the owner or breeder of the variety delegates his rights of seed production and seed marketing to other firms specialized in those activities:

19. He grants a license for the production and marketing of seed of the protected variety.

20. This takes the form of a private law contract laying down, for example, the following:

- the extent of propagation (hectares) and marketing (kilograms)
- the purchase of the initial seed (basic seed)
- technical support for propagation
- minimum technical quality of the seed produced
- the sales area
- measures to promote sales (marketing)
- packaging
- conditions of sale

21. In return for delegating the rights of production and marketing, the breeder receives from the production and marketing firm a license fee of which the amount is laid down by the breeder and which is also set out in the contract. It generally comprises a fixed amount per weight unit of the seed produced, or in the case of certain species, of the seed produced and sold.

22. All the contractual clauses and conditions described in paragraph 20 can only work if they can be accessed and checked by the variety owner. The breeder must have the possibility of determining whether the technical and commercial clauses are complied with by the licensee firm, particularly whether the license fees are calculated and paid correctly in accordance with the quantity and amount of the fees.

23. A licensing contract usually also determines the breeders' inspection rights:

e.g. access to the licensee's books. Where certification systems for seed production exist, it is most useful for this purpose to obtain information from the certification authorities on the quantities of certified seed for each protected variety.

24. Basically, two methods are used to check the contractual conditions, primarily to check the license fees that are due:

- Either the breeder carries out these checks himself,
- or he delegates this task to another organization.

25. In most countries in which licensing agreements are concluded, the breeders have set up their own organizations that undertake on their behalf to carry out these checks, to collect the license fees and then distribute them to the variety owners concerned.

26. Examples of such organizations are:

Germany: Saatguttreuhandverwaltungsgesellschaft (STV)

France: Caisse de Gestion de Licences des Variétés (CGLV)

United Kingdom: Plant Royalty Bureau.

27. The use of such organizations for carrying out checks presents the advantage of neutrality, i.e. the day-to-day business relationships between licensor and licensee do not suffer from the carrying out of those checks.

28. Finally, mention should be made of two problematic areas where breeders' rights are misused and which demand particular attention in their implementation.

Farm-saved Seed

29. For traditional and social reasons, plant variety protection law provides that a farmer may hold back seed for his own use from his own harvested material.

30. In such cases, however, the interests of the breeders must be adequately protected, i.e. the farmer should pay to the breeder a reasonable remuneration.

31. Unfortunately, it has not yet been possible for the breeders to assert this legal principle with the result that variety protection law is being misused.

32. Variety protection law further regulates the principle of breeders' privilege which permits any breeder to use a protected variety for his breeding work without the prior authorization or the payment of license fees to the owner of variety protection.

33. This right has been misused in the past to the extent that small unessential changes in the genome of a variety could be effected (cosmetic breeding) and a new variety created without any substantial intellectual effort.

34. The new principle of dependency (essentially derived varieties) has provided a solution in this case.

PUBLIC AND PRIVATE PLANT BREEDING AND PLANT BREEDERS' RIGHTS

1. Plant breeding is both an applied science and an art, with principles that derive from the science of genetics but whose implementation relies on the skill of the individual breeder. It has been a motor for economic development, both in the developed and developing countries, by providing varieties with substantially improved yield and quality characteristics. Sustainable progress has been demonstrated to occur when private sector involvement has been encouraged through the introduction of plant breeders' rights. As an activity of major significance to agricultural economies, plant breeding has merited considerable public sector funding, both nationally and internationally.

2. In mixed economies, public sector breeding normally covers areas which are not sufficiently profitable for the private sector to undertake, or where the outcome of research is too long-term or too uncertain for private sector involvement. This is clearly a dynamic situation, as economic development makes areas which were not previously attractive for private investment become so. There is evidence for this in the rapid spread of private plant breeding activity in a number of developing countries. Many new technologies are being patented by private sector companies which are investing heavily in relatively long-term biotechnology research. The question is, therefore: "What should be the continuing role of the public sector in plant breeding?"

3. There is clearly a continuing requirement for public sector support, both nationally and internationally, in the following areas:

- basic research and training in plant breeding methodology;
- germplasm collection and maintenance of key crop and related species;
- germplasm enhancement, to make the wide variability available in germplasm collections more readily usable by plant breeders;
- strategic plant breeding of finished varieties where these would not otherwise be developed by the private sector, particularly for resource-poor farmers in the developing countries.

4. Where the economic conditions of a country are such that agriculture can potentially support investment in plant breeding, the overwhelming evidence from countries which have been members of the UPOV Convention for some time is that continuing progress can be achieved by allowing plant breeding inventions to be protected. This is because:

- it allows a sustainable source of funding, which derives from improved agricultural production, to be ploughed back into further plant breeding;
- it can foster the transfer of technology because those who make inventions are provided with the incentive to distribute the products of the inventions more widely.

5. The interface between public and private sector activities should ideally be managed in such a way that these do not become competitive, but rather mutually supportive.

Public Sector Support

6. Virtually all countries with significant agriculture have Government funded plant breeding research, which takes place both in plant breeding institutes and universities. In addition, there has been since the 1950s a considerable investment in international plant breeding with the formation of the International Agricultural Research Centres (IARCs). By the early 1980s a global network of 13 such centres, supported by international funding gathered by the Consultative Group for International Agricultural Research (CGIAR), was in place, covering the improvement of key crops in the developing world (Table 1). The most significant impact from IARC research has been during the late 1960s and 1970s on wheat and rice production, the so-called 'green revolution'. More recently, considerable progress has been made with other crops, for example, cassava in West Africa, sorghum and millet in India, and grain legumes in Latin America and Africa. The question now facing the CGIAR system is how this large and effective international effort can adjust to the winds of change occurring in the global economic and scientific environment.

7. The changes occurring relate particularly to the liberalization of world trade and the development of new techniques derived from biotechnology. With or without agreement on the Uruguay Round of GATT, it is clear that many export-oriented developing countries are modifying policies to enable their own more effective participation in the expected growth in world trade. One of the essential elements of the GATT package is the adoption of intellectual property rights legislation, which would include provision for plant variety protection. The key element of international competitiveness will increasingly be the comparative efficiency of national agricultural production systems. Concurrent with these economic pressures, scientific progress in biotechnology is providing new horizons for plant improvement, which developing countries risk missing out on unless these inventions can be adequately protected and a capability for exploiting them can be developed. Where appropriate, it is considered that this can be achieved best by taking appropriate policy decisions to allow for such protection, and focusing public sector support on the key areas of basic research and training, germplasm collection and maintenance, germplasm enhancement, and strategic plant breeding of finished varieties.

Table 1: The main International Agricultural Research Centres (IARCs) with crop breeding and germplasm programs.

Centre	Country	Crop Breeding
CIAT	Colombia	Beans, Cassava, Pastures, Rice
CIMMYT	Mexico	Wheat, Maize, Barley
CIP	Peru	Potatoes
IBPGR	Italy	Germplasm collection
ICARDA	Syria	Wheat, Barley, Lentils, Faba Beans
ICRISAT	India	Sorghum, Millet, Chickpeas, Groundnuts
IITA	Nigeria	Cassava, Maize, Cowpeas, Soya Beans
IRRI	Philippines	Rice
WARDA	Cote d'Ivoire	Rice

Basic Research and Training

8. Universities are normally the main centers for basic research and training, although a significant training effort has also been made in developing countries by the IARCs. The training of scientists from developing countries in universities in the developed countries is clearly a major route for technology transfer. New techniques developed in universities and public sector research institutes continue to be a source of progress in the industry as a whole. Working with a wider range of germplasm than would normally be used in a commercial plant breeding program, many public sector research programs can generate novel traits which are then exploited to develop varieties. Examples of this are the development of hybrid production systems in oilseed rape (INRA, France), and the development of novel fatty acid composition in oilseeds (e.g. at Iowa State University).

Germplasm Collection and Maintenance

9. In addition to the major national germplasm collections (e.g. USDA), the IARCs and FAO have played an increasingly important role, since the mid 1960s, in the collection, documentation and distribution of genetic resources of the major staple crops. Genetic solutions to agricultural production problems imply continued free access to the widest possible range of germplasm resources of crop species and their wild relatives. In an increasingly privatized world, access to the world's land race and wild species collections must continue to be guaranteed. Most of the IARCs have developed formal policies to guarantee the availability of their collections, and, in 1988, the CGIAR issued a Policy Statement on Plant Genetic Resources which confirmed the 'open door' policy. The system, which has evolved over the past 25 years, has ensured access not only to germplasm, but through international networking, has provided a wealth of information on the exchanged materials. Recently the CGIAR has proposed to introduce 'material transfer agreements' for the distribution of such material. The purpose of these agreements would be to ensure that any useful genes discovered in the material could not be withheld from the country from which the material originated, nor could the Centres be prevented from using the material for the benefit of developing countries.

10. Global interdependence on germplasm can be illustrated by examining the crops in Kenya. Table 2 shows that many of the major crops derive from centers of diversity outside of Africa. The same could be said for most other agricultural production areas. It is clear from this that the introduction of crop species and varieties from outside has been a major determining factor in the ongoing development of agriculture in most countries.

Germplasm Enhancement

11. To make the wide range of variation available in germplasm collections useful to breeding programs, it is normally not only necessary to catalogue and describe the material, but also to engage in 'pre-breeding'. This means working on wide crosses or populations until they become useful as parents in a conventional breeding program. This type of work is normally undertaken in the public sector, and can be exemplified by the Netherlands, where the Government research institutes have opted for a complementary relationship with the private sector, placing themselves at an earlier point in the development chain. With few exceptions, the Government institutes do not release commercial varieties, but may market breeding lines with particular character combinations to the private sector.

12. A similar approach has been adopted by the IARCs, and can be exemplified by the work of CIMMYT in developing triticale, a new crop derived from wide crossing, and high lysine maize (opaque-2 gene). Both these projects required many years of pre-breeding. Previously to that, CIMMYT's wheat program achieved significant impact by introducing dwarfing genes, and more recently has had further impact by its work on spring x winter wheat crosses. The IARCs have made it a policy to distribute early generation material, requiring local selection before a final variety can be selected. By organizing such nurseries in a network, individual breeders can benefit from the experience of others with the same populations, thus facilitating the development of wide adaptation and yield across many locations. As described above for germplasm accessions, the IARCs are now proposing to distribute breeding material under a material transfer agreement.

Table 2: Global centers of diversity for important crop species in Kenya.

Species	Centre of Diversity
Agave sisalana	Mexico
Ananas comosus	Brazil/Venezuela
Arachis hypogaea	South America
Carica papaya	Mesoamerica
Cocos nucifera	Pacific
Coffea arabica	Ethiopia
Coffea canephora	Central Africa
Eleusine coracana	East Africa
Gossypium barbadense	Caribbean
Gossypium hirsutum	Mesoamerica
Hordeum vulgare	Ethiopia
Lycopersicum esculentum	Andean Zone
Manihot esculenta	Brazil/Paraguay
Pennisetum americanum	Tropical Africa
Phaseolus vulgaris	Mesoamerica
Saccharum spp.	Asia/Pacific
Solanum tuberosum	Andean Zone
Triticum aestivum	Central Asia
Vigna unguiculata	East/West Africa
Zea mays	Mesoamerica

Strategic Plant Breeding

13. Public sector plant breeding may be directed at producing finished varieties where the economics of breeding otherwise preclude private sector intervention, but where the crop is nevertheless of sufficient importance for government intervention. This is the case in France for vine and fruit tree varieties and rootstocks, and some vegetables such as chicory, asparagus, artichoke and cultivated mushrooms. INRA has found that the best way of making sure such material is offered to farmers rapidly and on the best possible terms, is to entrust its exclusive multiplication to a single company, with royalties payable to the institute.

14. Another aspect of critical importance is breeding and distributing improved crop varieties for resource-poor farmers. By definition, this is

unlikely to be an attractive market for the private sector, and yet a large proportion of the population of many developing countries falls into this category. This is, therefore, a major area requiring continuing public sector investment, both national and international, in addition to the support provided by charities and NGOs.

15. The CGIAR's new proposed policy indicates that material suitable for use as finished varieties would normally only be made available to Government organizations in developing countries, which could in turn release such varieties themselves or sub-license them to the private sector. This would offer the national organization an opportunity to obtain a financial benefit. In the case of developed countries, any financial returns derived from such agreements would be passed to an international fund which would be used for the direct benefit of developing countries.

Private Sector Breeding

16. The recognition of the rights of the breeder has proved by experience to be a very efficient means of encouraging plant breeding activities. The adoption of plant breeders' rights puts the breeder on the same footing as the inventor in other fields, or the author in the arts and literature.

17. The longest experience with the UPOV Convention has been gained in Europe. Over the years, there has been a shift from public sector breeding to the current situation where most varieties of major crop plants are developed in the private sector. A good example of this process is PBI Cambridge, which was a Government plant breeding research institute up to 1987, and has since then been part of the Unilever group. It continues to be a major breeder of wheat varieties for the United Kingdom, capturing approximately 80 percent of the market in the 1992/93 season, and its revenue largely derives from royalties.

Sustainable Source of Funding

18. Plant breeders' rights confer a monopoly over the commercialization of a variety for twenty years for most species, and as such provide a means for the breeder to benefit by sharing, through royalties, in the increased revenue resulting from the use of a new variety.

19. Plant breeding is clearly a long-term activity, and the time required to recover the investment can be long. Factors which can militate against private investment are the widespread use of farm-saved seed, and very slow turnover of varieties. Examples of the latter are fruit trees, where almost no private breeding companies are involved and programs have tended to be supported by the public sector, as described above. Potatoes have also proved to have a long variety life cycle and have not attracted as much private sector investment in breeding as some other crops. An example of this is PBI Cambridge's potato variety, Maris Piper, which was granted Plant Variety Rights in 1967, which have now expired, but the variety still commands a significant share of the UK potato acreage. For wheat and oilseed rape, however, the turnover of varieties is much more rapid, and a highly competitive market for these has developed in Europe.

20. There is, however, significant collaboration among competitors and with the public sector in basic research and trialling. An example of this is the industry structure for oilseed rape in France (Figure 1). The products of

breeding at INRA feed into a marketing division known as Agri-Obtentions. A feature of the seed industry in France is the formation of partners grouped in clubs, associations of breeders or economic interest groups. Such groups exist for practically all major species. In the case of oilseed rape, a group known as PROCOLZA is being formed. The clubs provide the interface with the public sector, as shown in Figure 1. In this way, a closer link has been developed between the public and private breeders in France than in the United Kingdom.

21. Although plant variety protection exists in the United States of America, the ease of reproduction of varieties of self-pollinated or clonally propagated crops tends to lead to private breeding companies being more actively involved with cross-pollinated crops, particularly maize, where varieties can be protected and value can be added by producing F_1 hybrids. There is considerable private sector breeding of soya beans, but the breeding of some other self-pollinated and clonal crops continues to be done in the public sector.

22. There are three main areas in which plant breeding shows synergy with other business areas:

- (i) agrochemicals and pharmaceuticals, e.g. Zeneca (ICI) and Sandoz;
- (ii) food manufacturing companies, e.g. Unilever and Campbells;
- (iii) farming cooperatives, e.g. Limagrain.

23. Agricultural and medical biotechnology share many of the same technologies. Improved disease and pest resistance is an expected outcome of the application of biotechnology to agriculture, and consequently this is a strategic area for those companies currently engaged in the manufacture of agrochemicals.

24. The food industry is reflecting a trend towards a preference for more natural and less processed food products, by endeavoring to gain competitive advantage through the enhancement of raw material quality. Modern techniques of plant breeding offer increasing scope for developing and selecting novel traits giving enhanced quality.

25. Farming cooperatives have become involved because plant breeding offers improved seed for their farming operations.

Technology Transfer

26. One of the major concerns expressed by some pressure groups is that intellectual property rights restrict the movement of technology, be it varieties or genes, to the exclusion of under-privileged groups or poor countries. In fact, the opposite can be the case. The reason is that breeders will not be willing to distribute their improved materials in countries where they cannot be protected. Making available the latest techniques and products of breeding to address the problems of agriculture in many developing countries is an urgent need, and ways need to be found to facilitate such technology transfer.

DISCUSSION

1. Dr. NDIRITU (Chairman) asked whether Dr. Kley would advise breeders in the countries concerned to establish their own breeders' organization. In relation to the topic of farm-saved seed and in a situation where farmers sell seed from farm to farm, should the law be binding on all farmers, especially farmers who are selling seed to other farmers to save the high costs of seed?

2. Dr. KLEY stated that he believed that there was a need to create a breeders' organization on a voluntary basis that would be able to grant licenses to other firms and establish a supporting contractual framework which could be generally accepted. In relation to the Chairman's second question, there was no reason why licenses should not be granted to farmers who produce and sell seed to other farmers. A very extensive work of publicity and explanation to the farmers was necessary in order to convince them.

3. A questioner asked whether it was possible for the breeder himself to benefit from his variety when the protection right is owned by some other person.

4. Mr. Greengrass explained that, where a private individual does the breeding work, that individual files the application for protection and has all the benefit. If the breeder is employed by an organization which provides the breeding resources and a secure salary for the breeder, then, subject to the breeder's terms of conditions of employment, the product of the breeder's work normally belonged to the organization that employed him. Where organizations employed good breeders and wished to encourage them, then, in many cases, they had systems of internal incentives, but these were really questions of employment law and of the terms and conditions of a person's employment.

5. Mr. NUTHAMIA (Chairman, Kenya National Farmers' Union) noted that the protection of plant varieties and all subsequent legal procedures were the domain of governments and UPOV and not of the general farmer. The farmer had full confidence in his government and UPOV and any law should take the UPOV Convention as the basis for any rights granted under it. He questioned, however, the point at which the variety user, i.e. the general farmer, participated in the licensing and pricing of varieties on the market.

6. Dr. Kley replied that the farmer became involved when he agreed to pay the final price for the seed, which price included all license fees and margins of the seed producing companies and the seed growers. The final prices were determined by competition and by the willingness of the consumer to pay a particular price for the variety of his choice rather than buying a competing variety.

7. Mr. ODONGO (NARC, KITALE) asked who would receive the royalties if one person worked for Kenya Breweries and another person worked for KARI and he produced a new variety? Would Kenya Breweries or KARI receive the royalties?

8. Mr. DAVIS stated that the answer depended on the particular situation of the variety. If KARI had been responsible for the earliest stages of development and had passed unfinished material to Kenya Breweries which Kenya Breweries then completed, the completed material would be unique to Kenya Breweries who could protect it and receive a grant of rights on it. If, however, the variety was developed by KARI and was simply utilized by Kenya Breweries, the situation would correspond to the situation of a variety, e.g. bred by INRA in France and marketed in France through Agri-Obtention. In cases of that kind,

there were normally royalty sharing arrangements between the user and the originator of the variety.

9. Mr. L.O. SESE (KIPO) questioned whether it was clear from the question of Mr. ODONGO of Kenya Breweries that there was a contract between Kenya Breweries and KARI. Accordingly, the answer to the question depended on the contract between the breeder and his employer and between his employer and any other party. Who got what depended on the circumstances.

10. Mr. KANYENJI (NDFRC, KATUMANI) stated that the International Agricultural Research Institutes tended to encourage regional trials which included contributions from various breeders of the best and most advanced materials. These materials, which were mostly fixed genetically, thus became freely available to the cooperating countries whose breeders could apply for rights in any of the varieties. Since the administration of breeders' rights is the prerogative of States and since breeders have to apply separately for protection in every State, he asked if it would not be beneficial to have a regional office to grant protection rights to breeders in those areas which have regional trials?

11. Mr. DAVIS thought in relation to regional trials that the trend was for such trials to include material at an early stage of development which, in Europe at least, would not be considered to be finished. The regional network provided information which could be utilized at the national level to enhance the local breeder's ability to select for wide adaptation at the national level. By selecting the material, the breeder completed the selection process and developed a variety which was his own. He hoped that the regional structures, such as those of the IARC's would continue in the presence of breeders' rights. There was no reason why, at a later stage, regional structures to grant breeders' rights should not be created by agreement between countries in the region.

12. Mr. KANYENJI suggested that rights might perhaps constrain the exchange of technology. If a breeder developed a good variety which required, however, some innovative processing, and a food technologist developed the technology necessary to improve the quality of the end products of the variety, how could one encourage the other professionals since the breeder alone is protected and not the food technologist?

13. Mr. DAVIS replied that, in relation to constraints on the movement of technology, it was clear that the major constraint was the absence of protection because those who had developed a technology would be unwilling to license it or transfer it to countries where the technology could not be protected. In the specific example of a breeder who developed a variety which had enhanced processing characteristics, he noted that this is an important area of synergy between the food processing industry and the plant breeding industry. The possible value from improved processing was an additional source of funding for breeding. A protected variety which gave a competitive advantage to the processor either because it gave lower costs of production in a factory or enhanced quality in the end product had value. The added value provided a reward to the processor for his innovation, but part of it could also find its way back to the plant breeder and the grower.

14. Mr. SESE (KIPO) asked if the meeting could direct its thinking towards the developing countries, particularly in Africa. Although in developed countries research is shifting with the support of governments from the public sector into the private sector, the situation in Africa was quite different. He did not think that private breeders or research institutions were going to

exist in Africa. In the case of Kenya, there were only five institutions and private companies which were doing actual research in plant breeding. In Africa, very few countries had the infrastructure which encouraged research. He thought that in the future developing countries might have to depend upon the developed countries for plant material for propagation and for adaptation to local conditions. There might be a problem since these poor countries depended on plant varieties for food production and they would be spending much of their hard won foreign exchange in order to buy the rights. Where could the farmer run, who could come to his rescue when he needed to eat?

15. Mr. DAVIS thought that clearly where varieties were licensed from abroad and if the technology was appropriate, it would be necessary to pay to use the varieties. But if the technology was appropriate, the payment would represent a very small proportion of the added value that was gained from using the technology. He did not, however, believe that the developing countries would become dependent on material from developed countries. From a biological point of view, the varieties from developed countries would, in most cases, lack adaptation to local conditions. He expected to see an enhanced regional development whereby breeding institutions were structured regionally which carried out the local germplasm enhancement work necessary to provide support to an emerging private sector. With that support, varieties could be developed locally, using a collaborative model rather similar to the one that existed in many countries in Europe.

16. The questioner had described the shift of breeding from the public sector to the private sector. The big question which this raised was: How should the interface between them be managed? He thought that this should best be done in a way which was non-competitive so that the comparative advantages of each were exploited to best advantage. In Africa, large numbers of farmers would need continuing breeding support and that support would need to continue to come from the public sector both nationally and internationally. On the other hand, he thought that the shift of responsibility to the private sector would enable seeds to be more effectively and efficiently marketed to farmers.

FOURTH SESSION

AFRICA

THE SEED INDUSTRY IN AFRICA AND PLANT BREEDERS' RIGHTS

PART I - OVERVIEW

Speaker: Mr. Nathaniel K. Arap Tum, Chairman, Kenya Agricultural Research Institute; Managing Director, Kenya Seed Company Ltd.

PART II - MALAWI REPORT

Speaker: Mr. R.W. GRAY, formerly General Manager, National Seed Company of Malawi, Seed Division, Lilongwe, Malawi

PART III - ZIMBABWE REPORT

Speaker: Mrs. Kusum Mtindi, Ministry of Lands, Agriculture and Water Development, Seed Services, Causeway, Harare, Zimbabwe

Chairman: Mr. John Harvey, Controller, Plant Variety Rights Office, Cambridge, United Kingdom

THE SEED INDUSTRY IN AFRICA AND PLANT BREEDERS' RIGHTS

PART I - OVERVIEW

1. The notion of seed is as old as the earliest civilization when hunting and fruit gathering were the main sources of food. As this source of food became scarce man began to tend some of the grains they had found useful as food. The idea of seed preservation was taken even more seriously in the temperate regions where extreme cold weather would virtually create a period of no plant growth. This is probably one of the reasons why we find the most advanced seed industries in the north temperate regions.
2. In Africa most of the so-called traditional crops--millet, cassava, yam and a wide range of vegetables--are just entering into the seed market. In fact, the seed industry in Africa is almost entirely based on the important food crops of the developed countries. Statistics on seed trade in Africa are very difficult to find. Farm-saved seed plays a major role in African agriculture, as do seed sales from farm to farm. Very few countries can be said to have a well organized seed industry where the essential elements are developed in a balanced manner. The countries which do have a fairly well established seed industry are Kenya, Malawi, South Africa and Zimbabwe.
3. In these countries there has been a concerted effort by both the government and private seed sector in improved agricultural productivity.
4. Initially, the government has supported public research in the fields of breeding and agronomy in selected crops. The government has also established the necessary infrastructure for the input delivery systems. And in some cases, there exist a National Seed Quality Control Service, National Seed Board and a sizeable extension service. In these countries, also one or more seed companies operate with well planned seed production programs, suitable processing facilities and dependable marketing channels.
5. Most developed seed industries in Africa produce seed of maize, wheat, barley and food beans. A few are engaged in sorghum, millet and oil crop seeds. To a lesser extent, but very few, are producing and processing horticultural seeds. There is a huge volume for imported seeds in all crops and especially in the horticultural seed industry. Very little research has been devoted to horticultural seed production in Africa. It would therefore be wise to encourage trade with developed countries. Also in the field of floriculture, cut flowers have a lucrative market in the developed countries.
6. But again, very little research work has been done in Africa. There is therefore a big diversity of not only foods but flowers, ornamentals and herbage which can be traded within the African countries and beyond. Seed demand will increase almost at the same pace as population growth. In Africa, the average population growth lies probably around 2.7% per annum, and assuming that per capita consumption also increases by, say, 1% annually, this will enhance food demand.

PLANT BREEDERS' RIGHTS

7. What would be the impact of plant breeders' rights on African agriculture? Will the introduction of plant breeders' rights result in a continued rapid growth in agricultural productivity? Would it restrict or encourage seed trade from country to country in the African continent?

8. The proponents of intellectual property protection argue that plant breeders' rights will encourage investment in research and that this would result in the development of better varieties which would increase yields. The opponents argue that plant breeders' rights will hinder developing countries from access to plant genetic resources and, if accessible, increase the burden on farmers income.

9. In the African context, both arguments are valid. One immediate advantage of plant breeders' rights in Africa would be technology transfer from developed countries.

10. With such seeds or such innovations being expensive to develop, it would only be fair to assure the creator a fair return on his investment. This ideally would be a good incentive for progress.

11. African agriculture is characterized by:

- Food deficit most of the times due to erratic rainfall and frequent droughts and famine.
- High population pressure on land and rather too frequent political upheavals which affect food production directly.
- Land tenure systems which do not favor land conservation methods, hence impoverished soils due to frequent soil erosion.
- Low income farmers favored by low cost input.

12. The different circumstances and problems of African farmers demand different and somewhat more complicated solutions from the ones that have worked in developed countries in recent decades. The average African farmer will be in a position to benefit greatly from improved varieties, but much less from single cross maize hybrids, until national researchers have dealt with the whole series of crop management problems with which those farmers are faced.

13. This scenario can however be overcome. It is my hope that UPOV would assist the various African countries in drafting and implementing under the best possible economic considerations, legislation on the protection of new plant varieties. It is also my hope that UPOV would conduct similar workshops in various African countries in order to inform the agricultural community, the researchers, breeders, lawyers on all aspects and facts of breeders' rights and to use the opportunity to gather opinions in order that its decisions may be right, appropriate to each country's circumstance, so that the full benefit on the improvement of plant and food production is achieved in as many countries in Africa as possible.

PART II - MALAWI REPORT

1. Until 1989, the National Seed Company of Malawi (NSCM) was an independent, commercially run company, though majority owned by a para-statal body. It enjoyed a special relationship with the breeders in the Research Department of the Ministry of Agriculture and was given free access to any new material coming out of Malawi Government (MG) breeding programs. There was no concern amongst the government breeders in respect of variety protection as their material was in the public domain.

2. Approaches had been made, to interest Malawi in variety protection, but it was apparent that MG felt that it could be deleterious to Malawi's interests to have protection of other breeders' material within the country.

3. Over the years, several seed houses have had their material included in MG varietal testing programs, in the hope of having them released for sale in Malawi. No variety submitted by an outside body has ever been approved by the Variety Release Committee, though non-Malawi-bred varieties have been released where they have been submitted by a seed company registered in Malawi. Non-Malawian seed companies were unwilling to supply inbred lines for seed production within the country in the absence of reliable protection. Furthermore, MG breeders were unhappy to include in their national variety trials material to whose pedigree they were not privy. This circumstance still obtains to a considerable degree.

4. In 1989, an international seed company bought a majority interest in NSCM and proceeded to test varieties from its own worldwide breeding programs. In 1991, a second international seed company commenced operations within Malawi, and can be expected to wish to test and market varieties from its programs.

5. Currently, no variety can be presented to the Variety Release Committee, for consideration for release, by anybody other than the MG breeder, and that only after it has been tested in his national trial program for a minimum of three seasons. In order to accept material for such testing the breeder requires information on the pedigree of the varieties submitted. In addition to this, the MG seed inspectorate requires access to the parent lines of a new hybrid, so that they may become familiar with it for inspection purposes. There is no mechanism for anybody other than the MG Inspectorate to inspect and certify seed crops, therefore all proprietorial parent lines are within the access of MG personnel who may not be particularly concerned about confidentiality.

6. The entry into the seed industry, in Malawi, of competing seed companies, with international connections and strong breeding programs, is a new phenomenon, and one with which the MG has yet to come to terms. MG feels it necessary to protect the smallholder farming sector from irresponsible promotion of inappropriate varieties by over-persuasive seed companies. MG is loath to relinquish close control of the material made available to the smallholder, and the consequence of this is a degree of exposure of confidential genetic material which private breeders cannot feel comfortable with. Malawi has acceded to the Paris Convention for the Protection of Industrial Property but there is some doubt as to whether the Patents Act has been adequately updated to provide adequate protection of intellectual property in the context of plant breeders' rights.

7. The recognition of the rights of the plant breeder to own and control varieties which he has bred would provide a powerful incentive for the development of the seed industry in Malawi.

PART III - ZIMBABWE REPORT

1. In the past, Governments had to achieve food self-sufficiency at the national level and they relied very heavily on commercial agriculture. The policy of the present Government is for food self-sufficiency at household and national levels. There is one common denominator of Governments, past and present; that is that a good seed forms the basis of successful crop production.

2. To get to this goal, the country has developed over the last 53 years a relatively sophisticated and efficient seed industry, and agriculture has benefitted immensely to the extent that the country has achieved food self-sufficiency whenever the Gods were favorable and looked favorably upon us, and large surpluses filled our grain silos.

3. The basic activities of a sound seed industry, including plant breeding, cultivar evaluation, quality control and monitoring, seed testing and extension services, are the Government's responsibility, whereas seed production, processing, marketing and distribution are carried out commercially. Three groups of organizations produce and market seeds, namely seed producers' associations, seed schemes operated by commodity boards and private autonomous seed companies. These are certifying agencies under the seeds certification scheme.

4. Organized seed production began in the country in 1940 under the auspices of the Southern Rhodesia Seed Maize Association, which indeed laid the foundation for efficient seed production for a number of agricultural crop species. It was a policy of the Government that seed production should be a completely commercial activity. The Government, on its part, still holds the reins of the seed industry by involving itself in seed production target setting, thus ensuring seed security, and in the pricing of seed. The Government believes that farmers should have access to good seed, in sufficient quantities, at reasonable prices.

5. The Government initiated breeding programs and still remains the major investor. A breeding effort was initiated by a local seed company in the mid-seventies and after the independence of Zimbabwe, also by internationals and multinationals.

6. Once an infrastructure for variety development and performance testing had been established the Government brought about seed legislation. The Seeds Act was promulgated in 1965, which was then followed by the Seed Regulations and the Seed Certification Scheme in 1971. The Plant Breeders' Rights Act and the Plant Breeders' Rights Regulations came into force in 1973 and 1974, respectively.

7. The plant breeder's right enables plant breeders or organizations to protect their varieties bred within and outside Zimbabwe. It protects the originators of a variety from the unauthorized use of that variety by other parties. The recipient of the right or the licensee is the only person permitted to sell seed or propagating material of that variety. Plant breeder's rights are granted for twenty years with the possible extension of five years.

8. Zimbabwe respects royalties and it is well-known in international circles that it pays royalties to the originators in other countries. Although mentioned, the necessary structures to collect royalties were never implemented. Plant breeders, both governmental and the private, were quite content with the

legal protection offered and are content to continue this way; the justification being that, if royalties should come into play, the price of seed would rise making it unaffordable to a certain sector of the community, that is the community of small-scale farmers. This would not only jeopardize the business of the seed company but it would also threaten the food security at household levels. But the governmental breeders, on the other hand, have sought to influence policy makers to secure that royalties should be claimed on government bred varieties. It should be emphasized that this is an area where one has to treat very carefully.

9. Varieties are released through the Variety Release Committee, which is an informal body. New varieties are channelled to two certifying agencies which are responsible for seed production with the exception of tobacco, cotton and potato, which are produced by the Seed Schemes of Commodity Organizations. Hybrid seed maize production is under the responsibility of the Zimbabwe Seed Maize Association and it operates under a tripartite agreement among the Government, the Commercial Farmers Union and the Association. Small grains, winter cereals and oil seeds are under the responsibility of the Crop Seeds Association, which operates under a bipartite agreement between the Government and the Association. Some of you would know these two certifying agencies as the Seed Co-op of Zimbabwe.

10. I appreciate that it is difficult for you to accept that only two certifying agencies are the recipients of Government bred varieties. Indeed, several companies, local and external, are pressuring the Government into allowing them to participate in the commercialization of Government bred varieties as a part of the deregulation of the national economy.

11. The Ministry of Agriculture, in its five-year plan, has recognized the potential of the seed industry. A concerted effort is underway to better the seed industry. The main actors are engaged in discussions to review the existing laws with a view to promoting the seed industry so as to meet the needs of the Nation and the Government's aspirations. This year [in 1993], Zimbabwe was admitted to the OECD Schemes for the Varietal Certification of Seed Moving in International Trade. From being an exporter of seeds in the region, Zimbabwe is ambitious to be a stronger and bigger exporter of seeds to the rest of the world.

12. The Ministry of Agriculture also made a statement in May 1992 that, from 1994, only certified seed of prescribed species will be allowed to be sold on the market. Currently, however, certified seeds of hybrid maize produced by the Seed Maize Association are available on the shelves alongside uncertified seeds of hybrid maize produced by foreign seed companies. Certified and uncertified crop species are produced and sold also by the local single monopoly. In spite of the certification scheme which was implemented in 1971, uncertified seeds have been continuously produced. Now I am pleased to announce that there will be only one class of seed of all species offered for sale in 1994. In fact, as the result of our concerted efforts, certified seeds of all crop species will be available for summer plantings in 1993.

13. Vegetables are an essential component in the daily diet. At present, a concerted effort is underway by the Government to produce vegetable varieties adapted to local conditions. Seed companies have always obtained their stock seed from Europe and South Africa and served the domestic market. The seed offered for sale should have passed through the phytosanitary test and should meet the requirements of the Seeds Regulations.

14. Foreign seed companies engage local seed companies for multiplication purposes and the resulting seed is exported. Local seed companies are encouraged to protect foreign varieties. Over 200 foreign varieties are registered in the Plant Breeder's Rights Register. 180 are rose varieties from Europe and the rest comprises peaches, apricots, nectarines, plums, prunes and asters.

15. In conclusion, I would like to say that the seed industry is going through some challenging and interesting times. The necessary amendments to the seed legislation are well under way. The quality of the national seed certification is improved, and should the Government decide to allow all seed companies to certify Government bred varieties, options will be available from the certifying authority on the method of implementation. The Government is keen to be a member of UPOV and it remains for the technocrats to move with speed. Zimbabwe is also scrutinizing the Seeds Act and its enabling regulations. I wish to thank the organizers for offering me the opportunity to present the seed scenario of Zimbabwe.

DISCUSSION

1. Dr. Wynand J. VAN DER WALT (South African National Seed Organization) stated that he was very pleased at the large number of delegates from African countries and that he thought it was a very important day for UPOV. Participants should never lose sight of the fact that plant breeders' rights legislation was aimed at ensuring a constant supply of good quality seed of adapted varieties to the farming community. That could only be achieved if there was adequate support for the plant breeders and plant breeding institutions. However, in the African context, the existence of a plant breeders' rights Act in a specific country will not necessarily ensure acceptance. There was a responsibility on the seed trade to promote the concept and take the farming community with them. There was no question of the interests of breeders being opposed to those of farmers. The two parties were partners; they were colleagues. He thought that the application of the law should take account of the African situation, where subsistence farming is a component of agriculture alongside, often large-scale, commercial farming. The way in which the message was conveyed would differ with the nature of the customer. In the case of subsistence farmers, little progress would be made if breeders walked around with a law book in their hands. It would be necessary to educate not only the farmers but also government agencies, welfare agencies, aid organizations and other people doing upliftment and extension work supporting the farmers. Farmers must be persuaded to use the best varieties and the best quality seed and they must be made aware when varieties were protected.

2. Turning to commercial farmers who currently had difficult financial positions, he thought that simply showing the law to him would not solve the problem of farm-saved seed. In South Africa, the industry had undertaken many activities to show farmers how to secure quality seed and the disadvantages of saving their own seed. This activity had been followed up with workshops and with articles in farming magazines. He thought that the national seed trades would need to be most active in making plant breeders' rights work in their respective countries.

3. Mr. Nathaniel K. ARAP TUM thought that the breeder should appreciate the position of the farmer. The breeder was better informed than the farmer and was aware of possible changes in legislation and technology; he should him-

self be an agent of change and must be aware of the need to educate the farmer. He was glad that, in Kenya, the issue of the rights of the breeder had been the subject of much discussion so that the breeder was well informed.

4. Mr. Jean DONNENWIRTH (Pioneer Hi-Bred International) noted that in the Seminar it seemed undisputed that private seed companies were necessary to support progress in agriculture in order that Africa could meet its growing food needs. However, seed companies needed a sound legal and economic environment for their operations. Several legislative elements were needed in addition to breeders' rights. For example, foreign companies should be allowed to hold a greater proportion of the shares of locally registered companies and to repatriate dividends after the payment of reasonable local company taxes as well as royalties from the licensing of plant breeders' rights. The import of seed from abroad should also be permitted provided the phytosanitary and quality standards established for those seeds were met while the general economic environment should enable farmers to purchase seeds as well as other inputs at reasonable prices. The private seed industry could not compete with seed which was given away or sold at artificially low prices. A good price for the farmer's production was an important factor in creating a satisfactory economic environment and loans for the purchase of certified seed would also help. Plant breeders' rights were an important part of the business environment, but alone, they were not enough.

5. One participant had noted that of 200 protected varieties in Zimbabwe, about 100 were varieties of rose. Did this reflect the plant breeding priority of Zimbabwe, or did it reflect the capability of the firm that developed the varieties to pay the fees for their protection?

6. Mrs. MTINDI replied that the export of cut flowers had become a very big industry in Zimbabwe. If protection was not offered, the varieties, mainly from European countries, would not be available to the cut-flower industry. The statistics in relation to roses did not reflect the plant breeding priorities of Zimbabwe.

CLOSING SESSION - PANEL DISCUSSION

1. Mr. John HARVEY (Chairman) suggested that the panel first discuss farm-saved seed. Farm-saved seed was a question of intellectual property but also a question of politics, social policy and agricultural economics. His view on intellectual property ground was that there was a valid case for controlling farm-saved seed but that case needed to be examined in differing situations. The United Kingdom did not currently control farm-saved seed, but that did not stop it from being a member of UPOV. It was quite possible to have a plant breeders' rights system and not to control farm-saved seed. In the United Kingdom, it was possible to envisage the existence of the political, social and agricultural economic arguments necessary to persuade its government to consider the possibility of allowing farm-saved seed to be controlled by breeders. Participants would, however, recognize that the political, social and agro-economic factors operating in the countries represented in the Seminar were not as you would find them in Western Europe. He did not see how breeders could possibly expect to control farm-saved seed in these countries, but you could have a plant breeders' rights system in accordance with the UPOV Convention without controlling farm-saved seed.

2. Mr. GREENGRASS (UPOV) further clarified the subject by explaining that, under the 1978 Act of the UPOV Convention, the breeder's right does not extend to the production of seed on the farm for non-commercial purposes. If the seed was to be consumed on the farm and was not to be sold, then the breeder's authorization was not required for the production of that seed. The breeder's authorization was only required for the production of seed for commercial purposes. Under the 1991 Act of the UPOV Convention, however, the breeder's right was so defined as to cover production of seed on the farm, but every country was free to make an exception to the breeder's right, thus defined, in respect of seed produced and used on the farm. Depending upon their economic conditions and the nature of their agriculture, countries will make differing decisions about how to make an exception in respect of farm-saved seed. Mr. HARVEY had referred to some of the situations that exist in Europe where agriculture is advanced, where farmers make very great use of a regular stream of improved new varieties and where, when economic conditions became difficult for farmers, as they were at the moment, there was a tendency for farmers to try and reduce their costs and produce more of their own seed. This, however, had the result that less income from royalties was available to fund plant breeding. It thus became a concern of governments that the farmers might be "shooting themselves in the foot" because they failed to provide the funding necessary to sustain the stream of varieties which was the basis of their competitiveness.

3. To put the whole question into perspective, at the meetings of ASSINSEL and FIS earlier in the week, the situation of farm-saved seed had been intensely debated. The American Seed Trade Association which represents the seed industry of a country with a very sophisticated farming industry, felt itself unable to vote in favor of certain motions opposing farm-saved seed. This was because, under the economic and agricultural conditions of the United States of America, where agriculture is very extensive, particularly in areas of comparatively dry land, farmers did produce a large proportion of their own seed. Accordingly, when the legislature of the United States of America comes to consider how the option to make an exception relating to seed produced by farmers should be exercised, it seems likely to make a broad exception in respect of such seed. Each country must decide what it wishes to do in its

own best interest. Plainly, many African countries, if they decided to adhere to the 1991 Act, would be likely to reserve certain rights for their farmers to produce their own seed of some species.

3. Mr. R.W. GRAY (Zambia) thought that farm seed was not a major problem in Africa where the seed industry was strongly focussed towards hybrid maize and did not breed open-pollinated species.

4. Mr. Nathaniel K. ARAP TUM asked what other countries shared the views of the United States of America.

5. Mr. GREENGRASS replied that he could not say what countries shared particular views but he could describe which countries had similar agricultural conditions. In the Mid-West of the United States of America, there were vast wheat farms often with limited moisture availability, where farmers were forced to produce their crops on a least-cost basis. Under their climatic conditions when they harvested their wheat, it germinated very well because of the very good harvest conditions, so that normally small grain cereal farmers in the United States of America, taken as a whole, only purchased, say, some twenty to thirty percent of the seed necessary to service their acreage. Other countries with similar conditions included Australia and Canada. He had, however, referred to the example of the United States of America only to emphasize that, under the UPOV Convention, each country is free to take its own position on the subject of farm-saved seed, subject to bearing in mind the interests and needs of plant breeders.

6. Mr. HARVEY noted that the countries of Southern Europe, Greece, Italy and Spain, also had similar good harvest conditions to those of the United States of America.

7. Mrs. MTINDI (Zimbabwe) stated that the Seed Act of Zimbabwe did permit farm-saved seed but did not allow the farmer to sell seed over the fence. Saving of seed was not much practiced, although it did happen in unimportant crops, like pearl millet and sorghum. The government extension service had educated the farmers on the merits of certified seed and loans were not available if other seed was used.

8. Dr. KLEY (Germany) stated that, in Europe, there were many differences between countries. Denmark and the Netherlands have a farm-saved seed percentage of 10, while France has 50% and Germany 40%. The differences perhaps arose from the differing traditions of the countries. There was, however, a short-term and a long-term aspect to the question. The short-term aspect in Europe today sees a reduction of support by farmers who seek to save money and to adopt low input farming. They increasingly used their own seeds of the self-pollinating species. On the other hand, farmers were well aware of the genetic progress made by plant breeders, and whenever a new variety is released to the market, they happily buy certified seed in order to take advantage of that genetic progress. Dr. Kley stated that the Chairman had said that the question of saving seed was a basic question of intellectual property. Accordingly, the moral argument that all intellectual creation should receive an equitable reward, should be borne in mind. The farmers were quick to take advantage of the technical advances of plant breeders and should be prepared to reward breeders appropriately.

9. The long-term aspect concerned whether plant breeding should be carried out by privately funded companies or by publicly funded institutes. Either the tax payer has to fund the breeding in public institutes or it was necessary

to find a way to fund breeding by the private sector by paying reasonable remuneration to the private companies.

10. Mr. O. NYACHAE (Kenya Breweries) commented that, in Kenya, they had been insisting since 1978 that farmers should plant certified seed, but over recent years, some 20% of farm-saved seed of barley had been used. When they tried to find out from farmers why they were saving seed, one of the reasons that was given was that barley was a self-pollinating crop and they did not see any difference between certified seed and their own seed. So we argued that to maintain health standards: "You should plant certified seed!"

11. Mr. HARVEY (Chairman) noted that one subject that had not been discussed during the Seminar was who would do the work and be responsible for a plant breeders' rights system if it were introduced.

12. A number of participants asked how it was done in other countries.

13. Mr. HARVEY stated that some countries had a government department, usually the Ministry of Agriculture, responsible for the implementation of the legislation, while responsibility was shared in a few countries between the Patent Office (responsible for legal formalities) and the Ministry of Agriculture (responsible for all technical questions). The question was one for each country to decide, but where the grant of plant breeders' rights was being incorporated into a national varietal registration system where distinctness, uniformity and stability testing (D.U.S.) was relevant to performance testing as well as to seed certification, his personal view was that the responsible department should be an agricultural department rather than a commercial or industry department.

14. Mr. GREENGRASS (UPOV) said that the work of operating plant breeders' rights systems fell into three parts: First, there was the formal business of receiving applications and examining the paper work to ascertain that the variety was indeed novel and that a suitable name had been proposed. Secondly, the office that was responsible for granting protection then had to satisfy itself that the technical criteria for protection were satisfied, i.e. that the variety was distinct, uniform and stable. In seeking evidence relating to the distinctness, uniformity and stability of a variety, many options were open. The office could, within its own structure, have a complete technical service, or that technical service could be delegated to some other entity that had the skills and resources required to grow and evaluate the necessary test plots of plants. The options did not end there because, in some countries, the examination could be based, subject to some fairly stringent criteria, upon work that was done by the breeder himself and upon data generated by the breeder himself. Further options arose from the fact that some UPOV member States were better equipped than others to carry out the examination of some species, so that one country may decide that it is not going to do the technical work in relation to a particular species. It passes the work of examining varieties of that species to the services of other countries that are particularly well equipped with the species with a request that they do the technical work. For a fee, those services will present a report, and the office will make its decision on the basis of the technical work carried out by the services of the other country. There were many possibilities, and this fact needed to be emphasized because it should not be imagined that, when a country sets up a plant variety protection system, it must immediately have the full technical resources to do the distinctness, uniformity and stability work for every species in the plant kingdom, because this was not the case.

15. If one could speculate how one might conceivably decide to proceed in a country, such as Kenya, there would perhaps be half a dozen crops where relatively large numbers of varieties are included in certification schemes. In these crops, the authorities might choose to do DUS tests in the field in Kenya. In the case of alstroemeria and other ornamentals, however, Kenya might enter into a bilateral agreement with a UPOV member State, such as the Netherlands, to which it would delegate the work, and make its technical decisions on varieties on the basis of the contracted work.

16. The third aspect of the work of the protection office is the actual grant of rights. The office makes the grant upon the basis of the technical findings presented to it which will have been generated using one or other of the options discussed earlier.

17. Mr. R.W. GRAY (Zambia) felt that UPOV was a loose organization to the extent that it provided guidelines, but that each country was free to do its own thing. Participants had heard that results could be purchased and that the way, tests are done in different countries, varies. They had also heard that, if a breeder had a variety which he wished to register in different countries, it was necessary for him to pay a registration fee and file applications in each individual country. Was it not possible to envisage progress to a situation where a breeder could apply to the UPOV Office which would make a grant of protection effective in all the member States of UPOV? That would surely save an awful lot of work.

18. Mr. GREENGRASS agreed that, from the breeder's standpoint, at some point in the future, it would be very desirable if you could, by one application, achieve what would otherwise require, say, 20 or 30 applications in many different countries. In the plant variety world, however, unlike the patent world where applications are frequently made in many countries, it was usually the case that a plant variety was adapted to specific environments, perhaps found only in a small group of countries in a region, so that the breeder might be interested in protection for a variety in, say, four or five countries. Accordingly, the pressure for the kind of evolution in the UPOV system suggested by Mr. Gray was not nearly as great as it was in the patent system where inventions could be relevant to very many countries. It was the pressure of demand from applicants in the patent system that resulted in the Patent Cooperation Treaty (PCT).

19. Mr. Gray had, however, described UPOV as a loose organization. Mr. Greengrass did not think that the description was apt because the UPOV Convention specifies the criteria for protection and a number of other required features in far more detail than you will find in most other intellectual property conventions. There was flexibility in the UPOV Convention, but that was not to say that it was a loose Convention. It was necessary to have flexibility because, when you have 23 [in May 1993] sovereign States as parties to a Convention, they naturally have their own national traditions and approaches and international conventions must have a reasonable degree of flexibility to take account of these factors. There was real flexibility in the UPOV Convention in the way in which the technical examination was conducted. But that was not to say that the standards that were established were low standards; they were not! He thought that all UPOV member States conducted a stringent examination of varieties for distinctness, uniformity and stability. The flexibility lay in the administrative structure of their offices.

20. Mr. HARVEY added that the European Community was developing a plant breeders' rights system which would grant a protection right effective across all its twelve member States as a result of a single application. If, at a future date, Kenya joined UPOV and a breeder from Kenya applied to the Community instead of the Netherlands for protection, he would get a right throughout the Community, not just a right in the Netherlands. The European Community's system was not yet in operation, but it was an example how a group of countries operating jointly can create a right which crosses national borders. Whether the same thing could be achieved in the future in Africa, or in Latin America, was for the countries of the region to decide. This was probably something for the future rather than today.

21. Mr. Dennis MUNGATE (Zimbabwe) referred to Mr. Davis' paper which described how the private and public sectors could cooperate in plant breeding and suggested that government programs should concentrate on germplasm development with a view to handing over selections for further adapted selection by the private sector. In Africa, the climate was very variable, and even on one farm it might be necessary to use several varieties. In Zimbabwe, there were five agricultural regions which meant that distinct varieties were required for each region. It was necessary to pass the government varieties to the private sector for multiplication. But as one moved towards the marginal areas, the private sector was not happy to multiply the necessary seed because of the reduced profit margins. In his view, it was the State's responsibility to ensure that the people in all areas had good access to sufficiently well adapted seeds and the State might need to continue breeding for this purpose.

22. Mr. HARVEY stated that he had come across the same problem in India where in some of the self-pollinating crops the private sector did not wish to market seed in areas of low agricultural productivity with a high ratio of farm-saved seed. So he accepted that there were circumstances in which the public sector should quite properly continue to operate in the seed industry.

23. Mr. Ato Dawit TADESSE (Ethiopia) referred to the article on the breeder's exemption from payment for the initial materials which they use as a source of variation. He thought that the initial material which have been collected by genebanks represented a considerable investment, particularly when one added in the costs of the enhancement programs that were going on. He was not sure that the right for the breeder to use the initial material freely was fair to the other disciplines involved, like conservation.

24. Mr. GREENGRASS explained that the UPOV Convention creates a system for rewarding the work of the breeder which comprises the activities which start with the basic material and conclude with the finished variety. The UPOV Convention required its member States to give the breeders certain minimum rights in the end product of the work they have done, irrespective of the source of the material. When the breeder finished his work in a UPOV member State, he did not have any right to stop other people using the work that he had done as a basis for a further step forward in breeding activity. The plant breeders of the last fifty to one hundred years had built each new variety upon the work of their predecessors, knowing that their own work was going to be exploited equally by those who came after them. This had been an equitable system and all countries had benefited from it. He understood the point that had been made by Mr. TADESSE which was whether indeed the original source of particular germplasm should or should not be rewarded in some way. But that was a new issue which had been raised in the UNCED Conference in Rio de Janeiro, Brazil, and involved completely new principles which did not necessarily involve the

provision of incentives for particular activity. Dealing more specifically with the question of the gene bank and its services, there was no reason why a gene bank, on providing physical material to a plant breeder, should not ask him as a term of the supply arrangement to make certain payments to the gene bank, either immediately for the service provided, and/or in the future in relation to any product developed from the material which was supplied.

CLOSING ADDRESS

by

Mr. Barry Greengrass, Vice Secretary-General of UPOV,
Geneva, Switzerland

I personally have immensely enjoyed the day and the evening that we have spent together. It think it has been very fruitful. The object of this Seminar was to make information available, so that the countries that were invited to participate in the Seminar could themselves give thought to whether or not plant variety protection was a useful instrument of agricultural policy for their conditions. It is very much the policy of UPOV not to put pressure upon countries to adopt plant variety protection, but simply to make sure that the necessary information is available to countries to make good decisions on the subject. In organizing this Seminar, we have had the most excellent assistance of the Kenya Agriculture Research Institute, its Chairman, Mr. Arap Tum, its Director, Dr. Ndiritu, and their staff. The reception last night, that we all so enjoyed, melted the ice magically for us all and got us all close together and talking more freely here today. I hope that you will have found this Seminar useful and you will take back home with you some useful information. From the standpoint of the UPOV Secretariat, we have received some very encouraging messages from Kenya and Zimbabwe, and we hope that perhaps after mature consideration some of the other countries which are represented will express a greater interest in plant variety protection in the future. Once again, many thanks to you all for participating, many thanks to the Chairmen of the sessions and to the speakers and, once again, many thanks to KARI and all the Kenyans who have made us feel so much at home over recent days.

CLOSING ADDRESS

by

Mr. Nathaniel K. Arap Tum, Chairman,
Kenya Agricultural Research Institute (KARI),
and Managing Director of the Kenya Seed Company Limited

On behalf of the Kenyan organizing team of Dr. Ndiritu, I would like to thank all of you for coming to Kenya for this Seminar. I would like to thank you in particular, Mr. Greengrass, for your patience. We know that you have repeated these things over and over again in your office and outside your office, and yet you are not tired explaining the very issues that are necessary to create awareness in the minds of those who have attended this meeting. We are thankful to those who have contributed their experiences to us. I think, with these shared experiences and the ideas that have been expressed in this meeting, the different countries that have participated will be able to reflect better upon the subject of plant variety protection. The decisions are ours at the end of the day. I wish you a nice journey home.

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