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

Pretoria, South Africa, May 3 to 5, 1995



Elise Buitendag

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 National Department of Agriculture of South Africa

and with the Financial Assistance of the Overseas Development Administration of the United Kingdom

Pretoria, South Africa, May 3 to 5, 1995



GENEVA 1996

The front cover shows the species *Pterocarpus angolensis*, the "Kiaat," and the back cover shows the species *Zantedeschia aethiopica*, an arum lily, painted by Mrs. Elise Buitendag (South Africa), currently Vice Chairman of the Technical Committee of UPOV

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FOREWORD

The International Union for the Protection of New Varieties of Plants (UPOV), in cooperation with the Department of Agriculture of South Africa and with the Financial Assistance of the Overseas Development Administration of the United Kingdom, organized an International Seminar on the Nature of and Rationale for the Protection of Plant Varieties under the UPOV Convention for countries of the Southern African Development Community, which was held in Pretoria, South Africa, from May 3 to 5, 1995.

This publication contains the texts of the presentations given by the speakers and a record of the discussions which took place during the Seminar.

UPOV takes this opportunity to express its thanks to the Department of Agriculture of South Africa for its excellent arrangements for the Seminar. UPOV also thanks the Overseas Development Administration of the United Kingdom for its financial support for the Seminar.

The Seminar was the third such Seminar to be held in Africa, earlier Seminars having been held in Kenya in May 1993 and Morocco in June 1993.

Arpad Bogsch Secretary-General

International Union for the Protection of New Varieties of Plants

Geneva, September 1996

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WELCOME ADDRESS

by

Dr. David P. Keetch, Director, Directorate Plant and Quality Control, National Department of Agriculture, Pretoria

Distinguished Delegates and Guests, Ladies and Gentlemen,

On behalf of the National Department of Agriculture, it is a great honor and pleasure for me to welcome you to South Africa. It is especially gratifying for me to welcome Mr. Barry Greengrass, Vice Secretary-General, International Union for the Protection of New Varieties of Plants (UPOV), Mr. Karl Olov Öster, President, National Plant Variety Board, Sweden, and Mr. David Boreham, Controller, Plant Variety Rights Office and Seed Division, United Kingdom. I would also like to extend a special welcome to the honorable delegates from Angola, Lesotho, Malawi, Namibia, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe, the Southern African Development Community, the South African Commission for the Conservation and Utilization of the Soil, and private organizations and associations.

Almost thirty-five years have passed since the signing of the UPOV Convention, and during this time the Union has formulated and implemented an effective system for the protection of new plant varieties. Initially, UPOV membership comprised various European countries, but as the importance of plant variety protection increased countries in other parts of the world started to join the Union. Today, more than 26 countries are members of UPOV and this number continues to grow.

While South Africa is presently the only country on the African continent which is a member of UPOV, several other African states have enacted legislation on plant variety protection. This development together with the lively debate currently surrounding the Biodiversity Agreement has created a situation in which the discussion of plant variety protection has become very relevant for countries of the Subcontinent. It is, therefore, very fitting that the UPOV Secretariat should have organized this Regional Seminar on the Protection of Plant Varieties under the UPOV Convention.

Propagating material, whether it be plants or seeds, is a basic requirement for agricultural production. It is important, therefore, to ensure that planting material of superior quality or performance be protected. This Seminar provides the ideal opportunity for this subject to be discussed on a regional basis. I trust that all delegates will use this occasion to obtain a proper understanding of plant variety protection and the UPOV Convention. I also hope that you will share your technical information and experiences to stimulate a greater cooperation in this field in Southern Africa.

In closing, may I again express my sincere appreciation to the UPOV Secretariat for organizing this Seminar and encouraging the countries of Southern Africa to consider the benefits of a plant variety protection system. May you all have a very enjoyable and stimulating Seminar.

Thank you.

OPENING ADDRESS

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

Madam Deputy Minister Msane of the National Department of Agriculture of South Africa,

Dr. David Keetch, Director, Directorate of Plant Quality Control, National Department of Agriculture of South Africa

Mr. Karl Olov Öster, Permanent Secretary, Ministry of Agriculture, Sweden, Mr. David Boreham, Controller, Plant Variety Rights Office, United Kingdom, Honorable participants from the States of Southern Africa nominated by their governments,

Ladies and Gentlemen,

It is a great source of satisfaction for the International Union for the Protection of New Varieties of Plants (UPOV) to have the opportunity to organize this Regional Seminar on the Protection of Plant Varieties under the UPOV Convention. It would not have been possible to organize this Seminar without the support of the National Department of Agriculture of South Africa, the Overseas Development Administration (ODA) of the United Kingdom, the Ministry of Agriculture, Forestry and Fisheries of the United Kingdom and the Ministry of Agriculture of Sweden.

For today's audience I need to say little concerning the importance of improved plant varieties for the development of agriculture and for the well-being of mankind. Plants are directly, or indirectly, the source of all human nutrition and important providers of fiber, fuel and raw materials for industry. The essence of plant breeding from the standpoint of the plant breeder is the selection of varieties which, when grown under the same conditions as existing varieties will provide more or better quality material at harvest time which can either be shared between the grower and society at large or, in the case of a subsistence grower, may provide improved food security for his family.

Today's Seminar is not an isolated event. Over recent years, UPOV has organized similar seminars in various regions of the world. The objective of these seminars is to bring factual, objective information concerning plant variety protection based upon the UPOV Convention to countries of each region so that they can decide whether the system of plant variety protection is a useful tool of agricultural policy for their region. Why "region?" The usefulness of a plant variety is not limited to national borders. Breeders are inevitably interested in protecting their varieties in neighboring countries with similar agro-ecological conditions. It is particularly interesting for developing countries to consider the subject of plant variety protection because most have a national investment in plant breeding.

The policy of UPOV has not been to promote the concept of plant variety protection but to wait for countries themselves to express an interest in the protection of plant varieties before taking action. UPOV always responds to countries expressing interest by providing information, advice and assistance in the preparation of nationals laws. However, in 1989, UPOV changed its policy somewhat because it could see certain trends on the world scene. It became apparent that pressures existed to require all countries to protect plant varieties by industrial patent. We had already seen some of the first drafts of what is called the TRIPS (the trade-related aspects of intellectual property) Agreement, whereby countries throughout the world were to be expected to protect their plant varieties by patents or, alternatively, by what is known as a *sui generis* system. It became apparent to UPOV that it was important to get information on plant variety protection to a wider spectrum of countries and, as a result, seminars were organized with the objective of bringing factual, objective information concerning plant variety protection under the UPOV Convention to the attention of governments, so that they could decide whether plant variety protection based upon the UPOV Convention was or was not in the best interest of their national agriculture. We have organized these seminars on a regional basis because it is important to think regionally in relation to plant variety protection.

It is my pleasure to open this Seminar. I hope that we will all get to know one another over the next three days.

WELCOME ADDRESS

by Ms. Thoko Msane, Deputy Minister, National Department of Agriculture, South Africa

At present South Africa is the only country in Africa which is a member of UPOV and in this context it is a great privilege for us to host a seminar on Plant Variety Protection, especially for the members of SADC. It is also a pleasure to welcome the Vice Secretary-General of UPOV, Mr. Barry Greengrass, Mr. Karl Olov Öster, President, National Plant Variety Board, Stockholm, Sweden, Mr. David Boreham, Controller of Plant Variety Rights Office, United Kingdom, the Secretary-General of SARCCUS, delegates from the SADC head offices in Harare, delegates form SADC member countries and delegates from international and professional organizations such as ASSINSEL and the International Federation of Agricultural Producers (IFAP).

South Africa has considerable experience of plant breeding. The need for better crops varieties has existed since man started to till the soil--there has always been the need to produce enough food for one's own use and a surplus that can be sold to others who cannot produce enough for themselves.

Plant breeding and selection was initially carried out by farmers. Lately, the South African Government started plant breeding projects on the most important crops. Finally, commercial plant breeders and seed firms became involved in plant breeding because of the profits to be made in the development and sale of new plant varieties.

Hickory King, a maize variety developed in the United States, was introduced into Kwazulu-Natal during the 1890s. It was selected for its adaptability to local conditions and is still available on a commercial scale today.

In 1910, the maize variety Potchefstroom Pearl, developed by the Potchefstroom Research Station, was released by the Department of Agriculture. This variety is a cross between Champion White Pearl and Hickory King and showed much better qualities than its parent lines. Subsequently, it also featured in many hybrid crosses.

Kalahari Early Pearl was bred and introduced in the first quarter of the century. This maize variety is still being produced all over Southern Africa mainly because of its good eating qualities and adaptability.

A concerted effort to breed better hybrid maize varieties started in the 1950s and this has led to the development of even better varieties which have made maize production in South Africa more effective, e.g. the 220 maize varieties on the official variety list.

South Africa started regulating seed production and the sale of seed in the 1920s and in 1944 Seed Certification was introduced. In 1961, South Africa participated in the International Seed Year and introduced a new seed law which was promulgated in March 1963. At the same time a need arose to regulate the plant breeding industry by establishing a

Plant Breeders' Rights Act. It was hoped that there would be sufficient incentive for seedsmen to undertake their own research programs.

The first Plant Breeders 'Rights Act was promulgated in 1966 but only made provision for South Africans to obtain plant breeders' rights. As new and better varieties were developed overseas and the need to provide some form of protection increased, a new Plant Breeders Rights Act was developed. In 1976, a Plant Breeders' Rights Act (Act. No. 15 of 1976) which complied with the UPOV Convention was enacted and South Africa became a member of UPOV in November 1977.

Since 1977, South Africa has participated in most UPOV activities and in the process has acquired much experience in the field of plant variety protection. This has had a marked effect on South Africa's fruit exports, cereals, flowers and other agricultural products.

The area of land suitable for agricultural production is declining year by year and therefore the best use must be made of the land which is still available. A sound plant breeding industry is needed to meet the demands of local consumers as well as the much larger international markets. Even the most successful countries are not self sufficient in terms of plant breeding and the supply of good quality propagating material.

Plant breeding is very expensive and to maintain an effective breeding program some form of remuneration is required. Furthermore, an effective plant breeding industry is essential if a country is to compete successfully on international markets. In the long run, no country can afford to continually buy its propagating material from other countries as this places it in a much weaker competitive position.

Not all crops have the same degree of adaptability and for that reason South Africa has concentrated its breeding program almost exclusively on two crops, maize and wheat, which are staple foods in South Africa.

Plant breeders' rights should therefore be seen as a means of providing the incentive for local plant breeders to receive compensation for their efforts. Locally bred varieties can also earn foreign currency for the holder of the right when somebody else, local or abroad, is given permission to multiply and produce propagating material under license.

Plant breeders' rights are also a mechanism to obtain high quality foreign plant varieties, confer protection on them in South Africa, and then to use them to supply the very competitive and sophisticated overseas markets.

Over the next few days, the concept of plant variety protection, with specific reference to the countries of the Southern African Development Community, will be discussed. This will involve the consideration of many issues of direct importance to the developing agricultural sector. I trust that these discussions will produce a meaningful exchange of ideas and a better understanding of the issues involved.

May I, on behalf of the Government and people of South Africa, wish you a very successful and stimulating seminar.

Thank you very much.

FIRST SESSION: GENERAL INFORMATION ON THE UPOV SYSTEM OF PLANT VARIETY PROTECTION

Chairman: Mr. David Boreham, Controller, Plant Variety Rights Office and Seed Division, Cambridge, United Kingdom

Introduction to Plant Variety Protection; What is Plant Variety Protection?

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

Technical Criteria for Protection

Speaker: Mrs. Elise Buitendag, Principal Plant and Quality Control Officer, Directorate of Plant and Quality Control, Nelspruit, South Africa

WHAT IS PLANT VARIETY PROTECTION?

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

1. This note serves as a guide in question and answer format to enable participants in the UPOV Seminar to gain some initial familiarity with the concept of plant variety protection.

What is Plant Variety Protection?

2. Plant variety protection, also called a "plant breeder's right," is an exclusive right to exploit his variety granted to the breeder of a new plant variety. It is a form of intellectual property right, examples of other such rights being patents, copyrights, trademarks, and industrial designs.

3. Plant variety protection has certain features in common with patents for industrial inventions. Both forms of protection grant to their holders a form of exclusive right so as to provide an incentive to pursue innovative activity.

4. Plant variety protection may also be compared with copyright, as plant variety protection enables the reproduction (copying) of protected plant varieties to be constrained by the owner of the protected variety.

5. Plant variety protection is an independent *sui generis* form of protection tailored for the purpose of the protection of new plant varieties, having certain features in common with other intellectual property rights but having at the same time fundamental differences.

Why Should New Plant Varieties be Protected?

6. New varieties of plants giving a higher harvested yield or providing resistance to plant pests, diseases, etc. are an essential factor in increasing productivity and product quality in agriculture, horticulture and forestry.

7. Breeding new varieties of plants requires a substantial investment in terms of skill, labor, material resources, and money, and may take many years (10 to 15 years in the case of many plant species). A new variety, once released, may in many cases be readily reproduced by others so as to deprive its breeder of the opportunity to profit adequately from his investment.

8. Granting to a breeder of a new variety the exclusive right to exploit his variety both encourages him to invest in plant breeding and contributes to the development of agriculture, horticulture and forestry.

What is UPOV?

9. The International Union for the Protection of New Varieties of Plants, known as "UPOV," is an intergovernmental organization with headquarters in Geneva. The acronym UPOV is derived from the French name of the organization, which is "Union Internationale pour la Protection des Obtentions Végétales."

10. UPOV was established by the International Convention for the Protection of New Varieties of Plants, which was signed in Paris in 1961 and entered into force in 1968. The Convention was revised in Geneva in 1972, 1978 and 1991.

11. The member States have undertaken to grant plant breeders' rights in respect of new plant varieties in accordance with the principles established in the Convention and thus on an internationally harmonized basis.

12. Most of the member States are bound by the 1978 Act, adopted at the Diplomatic Conference held in that year. Spain and Belgium are party only to the 1961/72 Act.

13. As of May 1, 1995, there are 27 member States of UPOV. Their dates of joining UPOV are given in Table 1, below:

State	Member since	
Argentina	December 25, 1994	
Australia	March 1, 1989	
Austria	July 14, 1994	
Belgium	December 5, 1976	
Canada	March 4, 1991	
Czech Republic	December 4, 1991	
Denmark	October 6, 1968	
Finland	April 16, 1993	
France	October 3, 1971	
Germany	August 10, 1968	
Hungary	April 16, 1983	
Ireland	November 8, 1981	
Israel	December 12, 1979	
Italy	July 1, 1977	
Japan	September 3, 1982	
Netherlands	August 10, 1968	
New Zealand	November 8, 1981	
Norway	September 13, 1993	
Poland	November 11, 1989	
Slovakia	December 4, 1991	
South Africa	November 6, 1977	
Spain	May 18, 1980	
Sweden	December 17, 1971	
Switzerland	July 10, 1977	
United Kingdom	August 10, 1968	
United States of America	November 8, 1981	
Uruguay	November 13, 1994	

Table 1: Membership of the Union (as of May 1, 1995)

Fig. 1 shows the geographical distribution of UPOV member States, the states which have adopted laws on plant variety protection and the States which are preparing a law on plant variety protection.

The 1978 Act is the Act of the UPOV Convention that is in force. However, in March 14. 1991, a Diplomatic Conference was held in Geneva which resulted in the unanimous adoption by the member States of UPOV of a 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. 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. For the time being no member State has deposited such an instrument, but Australia, Belarus, the Russian Federation and the United States of America have passed laws which accord with the 1991 Act. The European Community has adopted a Regulation which provides for the grant of a breeder's right pursuant to a single application which will have effect in each of the 15 States of the European Community. The Regulation conforms with the 1991 Act. Decision 345 which creates a system of plant variety protection for the countries of the Andean Pact (Bolivia, Colombia, Ecuador, Peru, Venezuela) enables these countries to have laws which conform with the 1991 Act.

15. The development of plant variety protection in terms of the number of protection titles is given in Fig. 2. Fig. 3 shows the ranking of the use of plant variety protection in terms of applications filed in 1993 in the member States of UPOV. This also shows the number of applications filed for varieties of foreign origin and their percentages vis-à-vis the total number of applications.

16. The initial content of this lecture is limited to the 1978 Act. This is the Act which binds all existing member States of UPOV and which is the basis of the existing UPOV system of plant variety protection.

17. The UPOV Convention has two main functions:

(i) it prescribes minimum rights that must be granted to plant breeders by its member States; that is to say, it specifies a minimum scope of protection;

(ii) it establishes novelty, distinctness, uniformity and stability and the establishment of a suitable denomination as the standard and criteria for the grant of protection.

What are the Exclusive Breeders' Rights Provided for in the 1978 Act of the UPOV Convention?

18. The breeder must be granted, as a minimum, the exclusive rights to produce for the purpose of commercial marketing, and to offer for sale and to market the propagating material of his variety. The minimum right extends only to the propagating material of his variety and not to the harvested end product, for example the fruit from a protected variety of fruit tree. Since the minimum exclusive right includes only production for commercial marketing, it does not extend to production of propagating material that is not for commercial marketing.

Accordingly, production of seed, for example, by a farmer for subsequent sowing on his own farm, falls outside the breeder's protection. Where States grant to breeders only the minimum right, farmers are free to sow and replant seed of protected varieties on their own farms, thus exercising what is often referred to as the farmer's privilege.

19. In 1961, when the UPOV Convention came into being, the scope of the minimum right accorded to the breeder represented a careful balance between the interests of breeders of new varieties on the one hand and the interests of users of new varieties (farmers and consumers) on the other hand.

How does Protection of an Innovation by Patent Compare with Protection of a Variety by Plant Variety Protection?

20. Table 2 below gives an outline comparison between protection of an invention by patent and protection of a variety by plant variety protection.

	Patent Protection	Plant Variety Protection
I. Object of protection	(industrial) invention	plant variety
II. Requirement for protection		
1. documentary examination	required	required
2. field examination	not required	required
3. plant material for testing	not required (may be deposited, however)	required
4. conditions for protection	 (a) novelty (b) industrial applicability (c) unobviousness (inventive step) (d) an enabling disclosure 	 (a) commercial novelty (b) distinctiveness (c) uniformity (d) stability (e) an appropriate denomination
III. Scope of Protection		
1. determination of scope of protection	determined by the claims of the patent	fixed by the national legislation (or by the UPOV Convention in the case of UPOV member States)
2. use of a protected variety for breeding further varieties	may require the authorization of the patentee	does not require authorization of the right holder (research exemption)

Table 2: Comparison between protection by patent and protection by plant variety protection

	Patent Protection	Plant Variety Protection
3. use of propagating material of the protected variety grown by a farmer for subsequent planting on the same farm	may require the authority of the patentee	does not generally require authorization of the right holder
IV. Variety Denomination	not required	required
V. Term of Protection	20 years from date of application	18 years for trees and vines, 15 years for other species, from date of grant (increased respectively to 25 years and 20 years in the 1991 Act)

In What Circumstances Should a Country Introduce a System of Plant Variety Protection?

21. A system of plant variety protection is of interest to any country which believes that a system of incentives based upon exclusive rights for individuals or entities engaged in plant breeding will increase the quantity or effectiveness of plant breeding relevant to its conditions. UPOV member States include countries where plant breeding is effected by state owned entities, by private individuals or entities or by a mixture of both.

22. Each member State of UPOV has decided that a system of incentives based upon the principles of the UPOV Convention will enhance plant breeding for its conditions to the national benefit. States seek from the introduction of plant variety protection, variously, to increase national plant breeding activity, to encourage breeders from other countries to satisfy their particular requirements, to create secure conditions under which foreign breeders or seedsmen can produce seed of protected varieties for re-export, or to transform their national seed trade from a service role into the role of a research and development based industry.

Is the Protection of Plant Breeders' Rights Harmful to the Conservation of Plant Genetic Resources?

23. Article 5(3) of the UPOV Convention expressly provides that a protected variety may be freely used by others to breed further varieties, i.e. it remains freely available as a plant genetic resource.

24. The experience of UPOV member States has shown that plant variety protection increases the number of breeders and, consequently, widens the spectrum of improved varieties available to farmers, with a potential increase in genetic variability.

25. The fact that new varieties offer substantial advantages to farmers does mean that farmers may choose to stop growing their existing varieties or land races in favor of new varieties, whether or not such plants are protected by plant breeders' rights. Ways must be

found to make important new varieties available to farmers generally whilst encouraging the continued use by some farmers of their existing varieties or land races so as to conserve their genetic diversity.

26. The Food and Agriculture Organization of the United Nations (FAO) at its 25th Conference in November 1989 endorsed an interpretation of the Undertaking on Plant Genetic Resources which accepts that there is no incompatibility between plant breeders' rights and the Undertaking.

Form of Protection

27. Article 2(1) of the 1978 Act of the UPOV Convention reads as follows:

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

The first sentence of this Article gives each member State a free hand in deciding on the form of protection; the plant variety right may be granted either in the form of a patent or in the form of a special title of protection, such as a "Certificate of Plant Variety Protection" or a "Plant Breeder's Right." The second sentence contains the so-called "ban on double protection" and was introduced to avoid possible problems arising from the coexistence of different schemes for the protection of varieties with different conditions for protection and different scopes of protection.

28. Most of the current 27 member States of UPOV have introduced a plant variety protection system in the form of a special title of protection. Two member States, Italy and Hungary, have introduced plant variety protection by adding special provisions to their patent laws. It is to be noted that the contents of the rights granted to the breeders of new plant varieties in Italy and Hungary are not different from the contents of the rights granted in the form of a special title of protection in the other member States; these rights in Italy and Hungary are called "patent rights," but are otherwise identical to the plant breeders' rights granted in other countries.

29. Under the national patent laws of many countries and under some regional treaties (e.g. the European Patent Convention, the Cartagena Agreement), plant (and animal) varieties are excluded from patent protection. Currently a patent may not be granted for plant varieties in the following countries: Algeria, Austria, Bahamas, Barbados, Belgium, Brazil, Bulgaria, Canada, Chile, China (except for relevant processes), Colombia, Cuba, Cyprus, Czech Republic, Democratic People's Republic of Korea, Denmark, Ecuador, European Patent Convention, Finland, France, Gambia, Germany, Ghana, Greece, Iceland, Indonesia¹, Israel, Kenya, Lesotho, Luxembourg, Madagascar, Malaysia, Mexico, Netherlands, Nigeria, Norway,

¹ Patents cannot be granted to food crops

Organization africaine de la propriété intellectuelle², Peru, Poland, Portugal, Republic of Korea (except plant varieties which are asexually reproduced), Saudi Arabia, Slovakia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Thailand, Uganda, United Kingdom, United Republic of Tanzania.

The United States of America has a special position among the current member States of 30. UPOV with regard to its forms of protection. The United States of America introduced plant variety protection as early as in 1930 for asexually propagated varieties (except tuber plants) by enacting the "Plant Patent Act." Although this is called a "Plant Patent," it is in face a sui generis protection right which is in most respects compatible with the UPOV Convention. The breeders of sexually propagated plants had to wait until 1970 when the Plant Variety Protection Act was introduced to secure protection in the United States of America for their varieties. The UPOV Convention requires, under its Article 2(1), that varieties belonging to one and the same genus or species be protected by only one form of protection. However, since there are botanical genera and species which can be propagated both sexually and asexually, the potential existed in the United States of America for protection to be granted by both plant patent and plant variety protection certificates for varieties of the same species. This feature of its laws impeded the United States of America from acceding to the 1961 Act. The membership of the United States of America became possible only after the revision of the UPOV Convention in 1978, where exceptional rules for protection under two forms were introduced (Article 37). The United States of America acceded to the UPOV Convention in 1981 (the provisions of Article 37 are such that only the United States has been able to take advantage of this Article). Furthermore, after the decision of the US Board of Patent Appeals and Interferences of September 18, 1985 (Hibberd Case), industrial patents (utility patents) can be granted in the United States of America for new varieties of plants. Accordingly, there are three forms of protection currently available for the protection of new plant varieties in the United States of America.

How is Plant Variety Protection Administered at the National Level?

31. Protection of new varieties is ensured in most UPOV member States by an application for protection addressed to the competent national authority appointed for the purpose.

32. The beneficial features of a newly developed variety can only be realized if authentic propagating material of the variety is made available.

33. Accordingly, in practice, there is an inevitable relationship between policies relating to the encouragement of plant breeding and policies directed to securing the availability of authentic high quality seed of plant varieties. Equally, many countries have chosen to permit the sale of new varieties of important crops only when the varieties have been independently tested in official trials.

34. Many of the current UPOV member States have built their national institutional arrangements for plant variety protection on the organizations responsible for seed quality control and variety testing. In many cases, the fulfillment of the technical conditions for plant

20.

² Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Gabon, Guinea, Mali, Mauritania, Niger, Senegal, Togo

variety protection, that is to say distinctness, uniformity and stability, are already amongst the prerequisites for the entry of a variety into an official variety list.

35. It may frequently be appropriate for the protection of new plant varieties to be administered as part of a national agricultural policy for seed quality control and the establishment of a national list of varieties recommended for cultivation. It should be noted, however, that the UPOV Convention requires the granting of protection to be independent from decisions concerning the regulation of seed trading.

36. Alternatively, since plant variety protection is a form of intellectual property, a number of States have chosen to give responsibility for the administration of plant variety protection to state institutions which are responsible for one or more other forms of intellectual property. In Hungary, Italy (and very recently Ukraine and Belarus) the patent office receives applications for and grants protection but delegates the technical examination of varieties for distinctness, uniformity and stability to the technical specialists of the Ministry of Agriculture. In New Zealand the system of plant variety protection is administered by an independent office in the Ministry of Commerce which Ministry is also responsible for patents and trademarks while in the United States of America, primarily for reasons of history, the protection of asexually reproduced varieties is the responsibility of the United States Patent and Trade Marks Office while the protection Office of the United States Department of Agriculture.

What is the Role of the UPOV Office?

37. The UPOV Convention established a "Union" of countries--the member States--which agreed to make available to breeders of other member States of the Union the same access to protection for their varieties as they made available to their own breeders. Any State with appropriate plant variety protection legislation has the opportunity through membership of UPOV to share in and benefit from the combined experience of the member States and to contribute to the worldwide promotion of plant breeding. A constant effort of intergovernmental cooperation is necessary to harmonize the activities of the member States and this requires the support of a specialized secretariat.

What does UPOV do?

38. The principal activities of UPOV are concerned with promoting international cooperation, mainly between its member States, and with assisting countries in the introduction of plant variety protection legislation.

39. Cooperation among the member States, particularly in the form of arrangements for the testing of varieties for distinctness, homogeneity and stability, is well established. Through such arrangements member States are able to restrict both the cost and time of checking whether varieties qualify for protection. It is clear that such cooperation will have a beneficial effect on the level of investment in plant breeding in the member States and on the introduction of valuable varieties from one member State to another.

40. The fact that the Convention contains provisions on the basic conditions that must be included in the variety protection legislation of States wishing to join the Union leads, in itself, to a degree of harmony in the laws of the member States. This harmony, in addition to providing an obvious benefit to plant breeders, facilitates active cooperation between member States, at both the administrative and the technical levels. The wish to operate as economically as possible has necessitated a continuous process of improvement and refinement of that cooperation, generally on the basis of recommendations and model agreements and forms developed by the Union.

41. To accomplish its tasks, UPOV has established, under the auspices of the Council, the following bodies:

- (1) Consultative Committee
- (2) Administrative and Legal Committee
- (3) Technical Committee.

The Technical Committee has the following Technical Working Parties:

- (i) Technical Working Party for Agricultural Crops
- (ii) Technical Working Party for Vegetables
- (iii) Technical Working Party for Fruit Crops
- (iv) Technical Working Party for Ornamental Plants and Forest Trees
- (v) Technical Working Party on Automation and Computer Programs.

How do Plant Breeders Exercise Their Rights in Practice?

Article 5 provides that any authorization given by the breeder in relation to the 42. production or marketing of his variety may be made subject to such conditions as he may specify. Subject to the provisions of individual national laws, the breeder is thus 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 himself or whether he will grant licenses to others, perhaps in exchange for a royalty. The practice in individual states varies, but generally speaking 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, or of hybrid varieties or of highquality vegetable seed, the practice of the breeder will probably be to control very tightly the production of seed in order to maintain the quality and reputation of his variety. In these cases he will seek his reward directly in the price of the seed. Many different situations exist, however, depending upon the commercial structure of seed distribution in each country and the logistical aspects of the production and distribution of a particular species.

22.

How can a Country Become a Member of UPOV?

43. Participants 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.

44. The period since 1961 has seen a steady growth in the number of States which are members of UPOV. Today UPOV has 27 member States. We can hope to see well in excess of 30 countries, including a number of developing countries, with laws for the protection of new plant varieties, which conform with the UPOV Convention, by the mid-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 many 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.

45. UPOV recommends to you the 1978 Act of the Convention which has received recognition throughout the world.

The 1991 Act of the Convention. Why was Revision Necessary?

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

47. First, under the system of the 1978 Act, it is possible for breeders to discover that their particular varieties cannot be protected in a country 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.

48. 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 <u>BUT</u> permits member States on a discretionary

24. THE NATURE OF AND RATIONALE FOR THE PROTECTION OF PLANT VARIETIES UNDER THE UPOV CONVENTION

basis to exempt from the breeder's right any traditional form of saving seed on the farm which they wish to retain.

49. 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, 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.

50. 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 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.

51. There are other changes in the 1991 Act but the changes to which reference has been made are the major substantive changes to which your attention needs to be drawn.

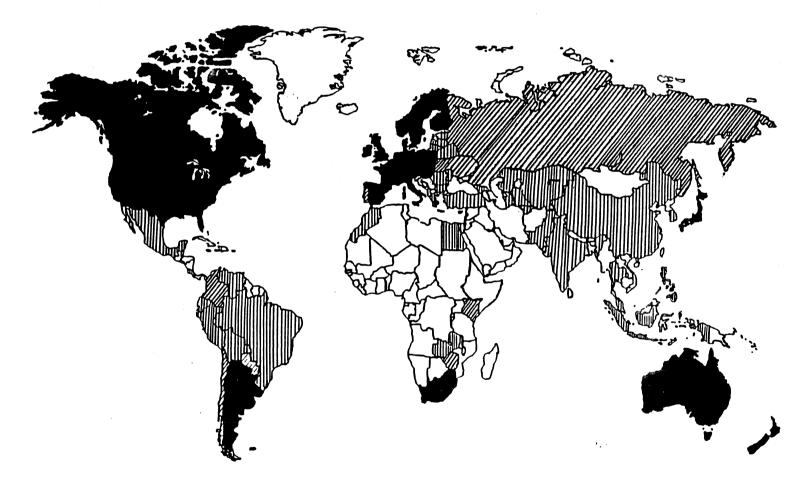
52. The changes which have been made are very rational and will provide plant breeders with a form of protection adapted to the needs of the twenty-first Century which represents, under today's circumstances, a fair balance between the interests of the breeders of new varieties on the one hand and the interests of the users of new varieties (farmers and consumers) on the other hand.

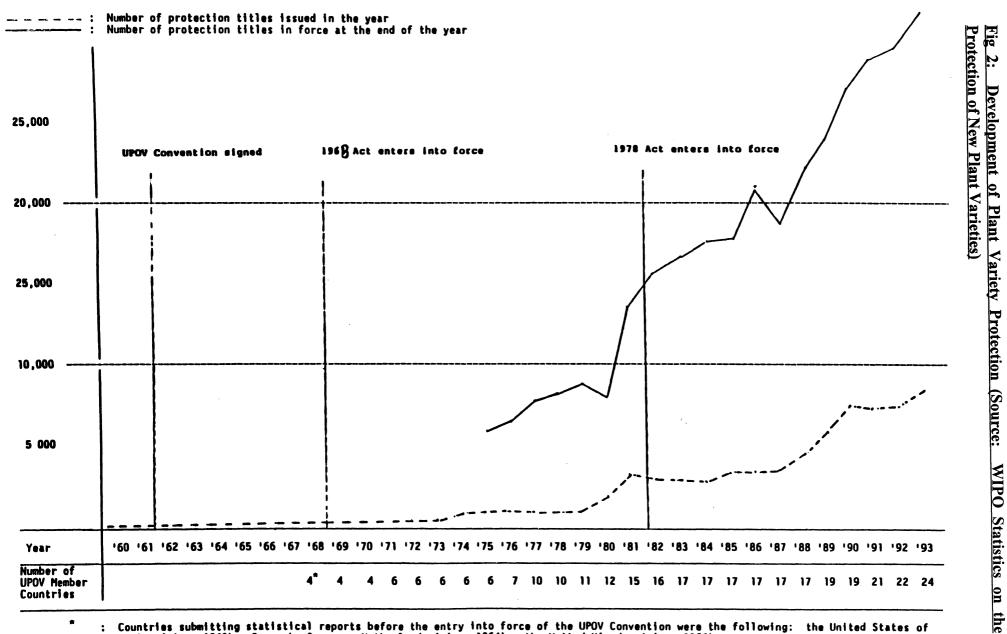
<u>Fig 1:</u>

Member States of UPOV as of July 1995

States having laws on plant variety protection: Chile, Colombia, Kenya, Paraguay, Portugal, the Russian Federation, Ukraine, Zimbabwe

States preparing laws on plant variety protection: Armenia, Belarus, Bolivia, Brazil, China, Costa Rica, Croatia, Egypt, Ecuador, Estonia, Greece, India, Indonesia, Kazakstan, Korea, Latvia, Lithuania, Mexico, Moldova, Morocco, Pakistan, Peru, the Philippines, Romania, Tajikistan, Thailand, Turkey, Uzbekistan, Venezuela, Zambia





: Countries submitting statistical reports before the entry into force of the UPOV Convention were the following: the United States of America (since 1949); Denmark, Germany, Natherlands (since 1964); the United Kingdom (since 1966)

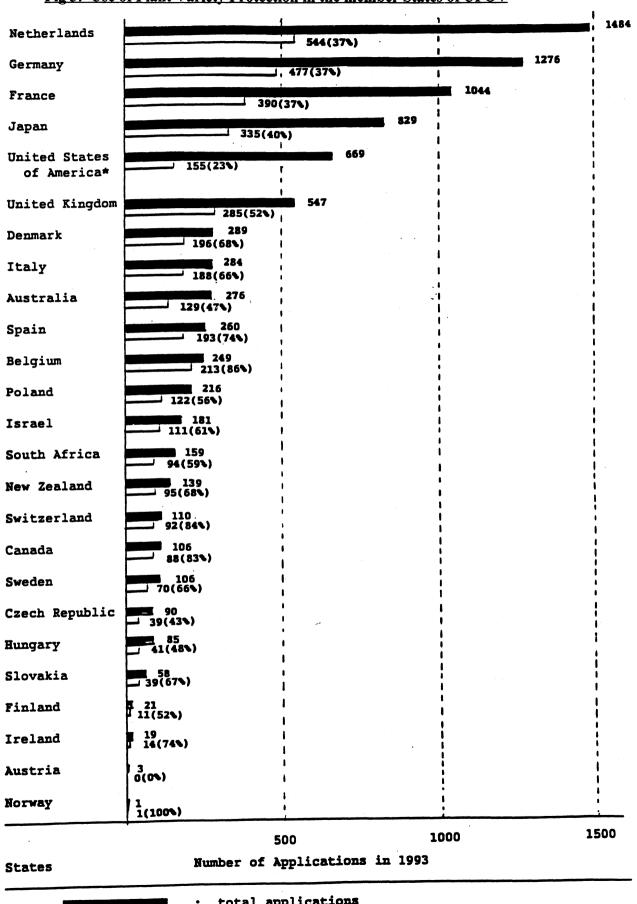


Fig 3: Use of Plant Variety Protection in the member States of UPOV

: total applications
: foreign applications
: percentage of foreign applications

] : percentage of foreign applications

* Total of applications under the Plant Variety Protection Act and Patent Law

DISCUSSIONS

1. <u>Dr. Joseph Mushonga</u> (Zimbabwe) asked what UPOV's approach was concerning developing countries. For example, if Zimbabwe were not to meet certain conditions specified in Article 4(3)(a) [Each member State shall, on the entry into force of this Convention apply the provisions of this Convention to at least 5 genera/species] in order to become a member State. He asked for UPOV's viewpoint on this and whether it would compromise.

<u>Mr. Barry Greengrass</u> (UPOV) replied that, in order to become a member State, one must initially protect 5 plant genera or species. This did not mean that there had to be national institutions which carried out the examinations (of 5 plant genera and species). He explained that one of the features of the cooperation amongst UPOV member States was that they have, in some cases, shared the burden of examination under bilateral agreements, whereby one country provides the examination for one species in return for another country providing the examination for another species. In Europe, for example, the test of certain species is more or less centralized. The tests for Apples and Chrysanthemum was carried out in the United Kingdom and the tests for soft fruits, such as strawberries and blackcurrents, are carried out in Germany. He explained that a similar situation could be applied to a region in Africa and that it would make sense if a number of countries with plant variety protection systems cooperated with one another. This potential for cooperation significantly reduced the burden of protecting a minimum number of plant genera and species.

2. <u>Mr. Saliem Fakir</u> (South Africa) commented on the introduction of biotechnology and the fact that certain genes or novel genes enhanced certain features or traits. He also pointed out that certain gene sequences were patented and thus protected and introduced in plant varieties. At the same time the plant variety was protected. He asked how this would change or shift plant breeders' rights *per se*.

<u>Mr. Greengrass</u> explained that UPOV offered protection for plant varieties. Protection was available irrespective of how the variety had been developed or of the technology used in its development. Conceivably, there might be another form of intellectual property protection, a patent, for example, that gave someone else a right exercisable over the variety if it incorporated a patented gene. The plant breeder might find that he had to take a license in relation to the gene. The 1991 Act of the UPOV Convention introduces essential derivation so as to ensure a better relationship between the two systems of protection.

3. <u>Dr. Stephen Muliokela</u> (Zambia), referring to page 8 of the lecture [a) commercial novelty and e) an appropriate denomination] wanted to know the following:

(a) Whether one could protect older varieties which are already known on the market;

(b) Whether breeders could experiment with their varieties before they protected them; and

(c) What was considered an appropriate denomination?

4. <u>Mr. Greengrass</u> answered the questions as follows:

(a) Old varieties are not novel and are not protected. One cannot protect varieties that are already in the market place. However, when a country first introduces protection for a species the Convention permits it to depart from the strict novelty rule in relation to a variety of "recent creation." A special rule can be established within the national law which would enable some existing varieties to be protected. The national rule should take into account the impact on certain parties in the country and the market place of giving an exclusive right over a variety that is being freely produced and sold.

(b) Providing a variety is not sold or offered for sale experimentation does not cause a loss of novelty. There is also a discretion whereby a country can give a grace period of one year before protection (selling for up to one year) without any loss of novelty. That grace period of one year has become compulsory in the 1991 Act.

(c) A series of rules on the subject of an appropriate denomination is found in Chapter 13 (Variety Denomination) of the 1978 Act.

5. <u>Dr. R. Ellis</u> (South Africa) spoke of UPOV and its Convention offering rewards and recognizing the efforts of formal plant breeders. There had also been outstanding efforts made by the informal sector in terms of conserving germplasm, as well as improving it. In South Africa, these sectors worked side by side. He asked how UPOV saw its role rewarding the efforts of the informal sector in conserving the germplasm which was essential for the formal sector.

<u>Mr. Greengrass</u> answered that a distinction between a "formal" and "informal" sector was not recognized by the UPOV Convention and that one could protect a plant variety if it were novel, distinct, uniform and stable, irrespective of whether it were bred formally or informally. These criteria for protection were necessary in order to define the unit of plant material in question in such a way that plant breeders' rights could be enforced in practice. It was a role for the responsible authorities of all UPOV member States to bring the rules related to plant variety protection to the attention of everybody who can benefit from protection. The informal sector must be encouraged to seek protection. The informal sector is in one way in the same position as the plant breeders themselves. Any improvement made by either must be available as a germplasm source for use by others.

TECHNICAL CRITERIA FOR PLANT VARIETY PROTECTION

by Mrs. Elise Buitendag, Principal Plant and Quality Control Officer, Directorate of Plant and Quality Control, National Department of Agriculture, Nelspruit, South Africa

1. Introduction

The purpose of the UPOV Convention is to recognize and protect the rights of the breeder of a new plant variety under certain specified conditions. This paper concentrates specifically on the technical requirements, as internationally harmonized under the provisions of this Convention, that qualify a plant variety for protection.

Protection may only be granted to a variety on condition that it has been proved clearly distinct from any variety of common knowledge and that it is sufficiently uniform and stable. The testing system for determining Distinctness, Uniformity and Stability, generally referred to as "DUS" testing, is a technical examination performed according to standardized principles established by UPOV. It comprises a comparative growing trial, which involves sampling, observation and measurement, processing and evaluation. These trials are conducted either by the official national authorities or, to varying degrees, by the breeders themselves. In order to interpret the DUS criteria on a common basis, UPOV has established Guidelines for the Conduct of Tests for Distinctness, Uniformity and Stability, the so-called "Test Guidelines."

Before the development of the UPOV system, many countries had their own regulations regarding plant variety protection. The criteria for the grant of rights differed from one country to another and even the variety concept was not seen in the same light in all countries. The technical standards and testing procedures depended largely on the expertise of the official concerned. This lack of harmonization caused problems, especially when a breeder sought protection for his variety in several countries. A variety which had been granted protection in one country might be rejected in another or vice versa. It was realized that harmonization was urgently required and this responsibility was taken on by UPOV, as a result of the adoption of the International Convention for the Protection of New Varieties of Plants in 1961.

2. The Variety Concept

2.1 Definition of a Plant Variety in General

Article 1 of the 1991 Act of the UPOV Convention gives a broad definition of a plant variety, including varieties not necessarily meeting the conditions for the grant of a breeder's right. A variety in general is a plant grouping within a single botanical taxon of the lowest known rank, which can be

- defined by the expression of the characteristics resulting from a given genotype or combination of genotypes (it should be sufficiently uniform to enable description by these characteristics),

- distinguished from any other plant grouping by the expression of at least one of these characteristics (it should be distinct) and

- considered as a unit with regard to its suitability for being propagated unchanged (it should be stable).

2.2 Requirements for a Plant Variety Eligible for Protection

Technical criteria for a variety eligible for protection under the UPOV Convention are set at a higher level than the general definition stated above. Article 7 of the 1991 Act requires that a variety, to qualify for protection, should be clearly distinguishable from any other variety whose existence is a matter of common knowledge at the time of filing the application.

The criteria for novelty are listed under Article 6 and the conditions for uniformity and stability, as required for breeders' rights, are stated under Articles 8 and 9 respectively.

In order to sustain a solid plant breeders' rights system in which each protected variety has a clear identity, the DUS testing should be reliable and repeatable. The minimum degree of distinctness from the nearest (or most similar) variety for the purpose of protection has been discussed for many years within UPOV, using the term "minimum distances". Minimum distances between varieties should not become so small that plagiarism is promoted and protection eventually becomes meaningless. The larger the distance the stronger the protection but if the umbrella of protection around each variety is too large it may lead to monopoly, inhibiting the release of other new varieties.

Atypical plants, or off-types, which may occur due to occasional mixtures, mutations or other causes, should be limited to such a degree that accurate description and the assessment of distinctness is possible and that stability is ensured. Such an acceptable level of uniformity is also an essential prerequisite for commercial production of the variety, giving assurance of quality to the producer as well as the consumer. Practically speaking, the protected variety should be a clearly defined unit that can be identified in the commercial trade. Protection should furthermore offer a high degree of legal certainty in order to be defensible in a court of law, if necessary.

It may be mentioned that the protectable variety is considered to be synonymous to a cultivar or cultivated variety, and not to a botanical variety. This implies some form of breeding or technical screening and not merely selection from the wild, a fact that is important to keep in mind particularly in South Africa, with its vast diversity of indigenous flora still waiting to be exploited.

3. <u>The Growing Trials</u>

3.1 Comparison to Similar Varieties

To test whether a candidate variety meets the DUS criteria, it is compared to varieties of common knowledge in a growing trial. A Technical Questionnaire completed by the applicant and submitted with the application, indicates characteristics of importance for selecting varieties most similar to the candidate. These reference (standard) varieties are included in the trial, together with the candidate, for side-by-side comparison. A red rose candidate variety, for example, need not be compared to all known rose varieties but only to those with red flowers. Other characteristics, such as growth habit, may limit the extent of the trial even further.

The similar varieties to be taken into account for comparison should not, however, be limited to national borders. An application for protection or for entry into an official register anywhere in the world causes the variety to be regarded as a matter of common knowledge. Testing officials communicate internationally and strive to keep up to date with varieties protected elsewhere. Crop experts may also be consulted. They are often well informed on foreign varieties and know which ones are likely to be relevant in each case. In South Africa the Rose Society is such an example.

As far as possible, consideration is also given to obsolete varieties no more in trade and often known to exist only by incomplete and imprecise descriptions in literature.

It is becoming more and more difficult to keep up with the increasing number of varieties world-wide and UPOV is currently working on a possible Central Computerized Data Base which will hopefully be in operation soon. This will greatly enhance the speed and volume of international data exchange, particularly with regard to varietal denominations.

3.2 Cooperation in Testing

Time, expense and expertise are involved in carrying out the DUS trials. Live collections of reference varieties need to be maintained and well trained experts are required for each genus or species tested.

The UPOV Convention does not oblige the national authorities to perform the testing themselves. They may delegate the task to another party, or make use of results already obtained by another party. The task of those national authorities who choose to accept full responsibility for the technical examination is becoming increasingly demanding, especially since their lists of protectable plant species are continually being extended. These lists are totally abandoned under the 1991 Act of the Convention and varieties of all botanical taxa will have to be eligible for protection within a period of five years after its coming into effect in a particular State. It is unthinkable that official testing stations will be able to provide testing facilities for all taxa applied for and member States are increasingly considering the adoption of systems of co-operation with breeders or with the competent authorities of other States.

International Cooperation

Cooperation with other member States in DUS testing alleviates the problem of dealing with genera or species for which comprehensive variety collections, adequate funds or technical expertise are lacking in a particular State. Such international cooperation often begins as a mere exchange of varietal data and may develop to a more formal bilateral testing agreement.

The ultimate form of international co-operation is a centralized testing system where the full procedure is carried out by one authority on behalf of other member States, independent of the origin of the varieties or their applicants. Chrysanthemums, for example, are tested in the United Kingdom on behalf of most other member States, including South Africa. South Africa has offered reciprocal facilities for some of its indigenous ornamental genera. A great advantage of central testing is that it provides a single basis for decisions on distinctness, uniformity and stability for all varieties.

Cooperation with Breeders

Close cooperation with breeders has always been promoted by UPOV, even in the case of member States with a strictly official testing system. Basically, breeders are required to provide the testing authorities with all necessary information, documentation and propagating material but, to varying degrees, they may partake more actively in the actual testing process. Some member States have a system where breeders even perform the examinations themselves, subject to the strict technical principles and high degree of legal certainty required by UPOV. Such cooperation is particularly useful for those species for which breeding activity is limited to a few breeders who are highly specialized in their particular field.

In South Africa, plant breeders' rights are totally administered by the official authority, although we do make use of the breeders' facilities under certain circumstances. It has happened in minor crops such as granadilla, for example, that the applicant had a well laid out trial with the full range of reference varieties concerned, enabling the officials to perform the testing on the breeder's premises. At the other extreme are such well established industries as the citrus industry, which has available carefully controlled evaluation trials. Instead of going to the expenditure of establishing its own examination plots, the official testing authority makes use of these existing facilities. This is also to the advantage of the breeders, since it is time-saving, especially in the case of trees taking some years to reach fruiting maturity. A friendly, informal relationship exists here between the testing officials and the breeders and often reference varieties are selected for inclusion in the trials by personal communication, even before the application for plant breeders' rights has been filed.

4. Test Guidelines

4.1 <u>Preparation of Test Guidelines</u>

In order to realize the objective of protecting new plant varieties in accordance with internationally harmonized principles, UPOV has devoted special attention right from the start to the development of a technical system that would provide a common basis for all DUS testing. The system is aimed at being widely acceptable and producing results that are as far as possible comparable between different member States.

The body within UPOV responsible for this task is the Technical Committee, with different Technical Working Parties functioning under its guidance. At present four Technical Working Parties are each responsible for a different group of species. They are the Technical Working Party for Agricultural Crops (TWA), for Fruit Crops (TWF), for Ornamental Plants and Forest Trees (TWO) and for Vegetables (TWV). A fifth Technical Working Party, namely on Automation and Computer Programs (TWC), deals with matters arising from the other Working Parties concerning statistical methods and computerization applicable to variety testing. A Working Group on Biochemical and Molecular Techniques and DNA-Profiling in Particular (BMT) was established recently to investigate the possibility of introducing certain new methods for plant breeders' rights purposes.

Each Technical Working Party consists of experts from the national offices of the UPOV member States. Their most important function is the development of Test Guidelines, each document presenting the technical requirements for DUS testing of a particular genus or species. The Working Parties meet on a regular basis, usually once a year, alternating the location between the different States. In this way personal communication is maintained by the members and they have the opportunity to learn about the testing methods and technology used in each country. Through participating in these meetings, experts from new member States are enabled to rapidly acquaint themselves with the general UPOV philosophy as well as the technical details to be taken into consideration when testing varieties.

When a Technical Working Party has decided to establish Test Guidelines for a particular genus or species, it asks one of its members to prepare a working paper which is analyzed and discussed in detail in one or more sessions. This process is not independent of the breeders, since experts from breeders' organizations are invited to participate in the meetings. Their broad knowledge and experience make a valuable contribution to the discussions. Once the Working Party has completed its work, a preliminary draft document is prepared and distributed to international professional organizations in order to collect comments from a wider range of experts. The Working Party subsequently rediscusses the document, taking these comments into account before preparing a final draft for submission to the Technical Committee for approval and adoption as the official UPOV Test Guidelines for the genus or species concerned.

Existing Test Guidelines are revised periodically in order to accommodate varietal changes and new developments in for instance breeding techniques, statistical approaches or methods for distinguishing varieties.

In South Africa we were faced with testing a number of botanical taxa such as subtropical fruit crops and various indigenous ornamentals, for which UPOV Test Guidelines were not yet available. Working papers for avocado, banana, citrus, guava, macadamia and mango, as well as for Leucadendron, Leucospermum, Protea, Lachenalia and Ornithogalum were initially drafted here and, after passing through the various stages of preparation, finally published as UPOV Test Guidelines. Working papers drafted for national use, such as those for coffee, ginger, granadilla and pineapple, may also eventually be taken up by UPOV for development into international Test Guidelines, as the need arises.

Currently UPOV Test Guidelines are available for 149 different botanical taxa. Those already published or in preparation are listed at the end of this paper.

4.2 <u>Composition of Test Guidelines</u>

UPOV has published a General Introduction to the Test Guidelines, which explains the nature of the Guidelines and the general principles that apply to DUS testing. All UPOV Test Guidelines are prepared according to this document, although some changes have been accepted since its publication.

At present, the Guidelines are presented in three-language versions, namely English, French and German. Each document is divided into the following headings:

I. <u>Subject of the Guidelines</u>

The botanical taxon (or taxa) to which the document is applicable, is specified. In some cases the applicability is limited to varieties with a particular end-use or a particular method of reproduction.

II. Material Required

The quality, quantity and type of plant material to be submitted by the breeder for the growing trials are specified.

III. Conduct of Tests

Conditions are listed under which the tests must be carried out, such as the number of plants, the number of replications, duration of tests, as well as special growing conditions, for instance a greenhouse, etc.

IV. Methods and Observations

Conditions are given for observing the characteristics, such as the time of observation, the number of plant parts to be observed, etc.

V. Grouping of Varieties

Key characteristics are listed that have been proved specifically useful for combining varieties into similar groups. These so-called grouping characteristics have been selected from the Table of Characteristics in the Guidelines and they facilitate the selection of reference varieties to be included in the comparison trial.

VI. Characteristics and Symbols

Explanatory notes are given on the nature of characteristics and symbols included.

VII. Table of Characteristics

Those characteristics that are considered by UPOV to be appropriate for DUS testing of the genus or species concerned, are tabulated.

VIII. Explanations on the Table of Characteristics

Explanatory drawings or detailed descriptions of methods or equipment are given where necessary, to ensure that different testing authorities make use of the characteristics on a common basis.

IX. Literature

Literature which may be useful in testing the genus or species concerned, is listed.

X. <u>Technical Questionnaire</u>

This is a recommendation for the Technical Questionnaire to be completed by the applicant at the time of filing the application. It gives the testing authority a minimum amount of technical information for designing the trial and for choosing reference varieties to be grown together with the candidate variety.

5. Characteristics Used in Testing

5.1 <u>Selection of Characteristics</u>

Characteristics that are considered to be important for DUS testing of the genus or species concerned, are included in the Test Guidelines. Such characteristics may be morphological, physiological, biochemical or of another nature but they must be capable of precise recognition and description.

It may not always be necessary to use all these characteristics in the testing process. However, to harmonize descriptions issued by member States, certain characteristics have been marked by an asterisk (*) to show that their use is mandatory. Additional characteristics not appearing in the Guidelines may also be used by the testing authority if they are considered useful.

Some member States accept a large number of characteristics for DUS testing, which means that the breeder has to make his variety uniform for all those characteristics. Other States may accept a smaller number in order to avoid an unnecessary workload but with the consequences that it may be more difficult to distinguish a candidate variety within the limited number of characteristics.

Although some degree of fluctuation in the expression of genetically controlled differences is expected under different environmental circumstances, priority is given to those inherited characteristics that are least susceptible to environmental influences. Precisely defined testing procedures are also of importance in minimizing the influence of

environmental conditions. In testing citrus, for example, we have to be careful that expressions of characteristics are not due to some disease or mineral deficiency. Rootstocks may also have an effect and certain expressions occurring during the youth phase of a tree may disappear with age.

Under the UPOV system, characteristics are selected from the point of view of suitability for DUS testing and not for their economic importance. The superiority or usefulness of a variety is not a criterion for protection, since the economic value of its so-called performance characteristics may change from time to time and from country to country. It is for the users of the variety to decide on its superiority or usefulness and not for the DUS testing authorities. Performance characteristics may other characteristics. Examples include plant height, fruit color and time of fruit maturity. Disease resistance characteristics may be included, provided that they can be precisely tested and that they are necessary for establishing distinctness. It is important that each disease resistance characteristic should be well defined and that an accepted, standardized method be prescribed for its evaluation.

5.2 States of Expression of Characteristics

The characteristics are scored according to a range of different possibilities, or states of expression, each supplied with a note for electronic data processing. In order to give better definition to the states of expression, each is complemented, where possible, by at least one example variety, chosen from the most popular existing varieties.

5.3 Quantitative and Qualitative Characteristics

Quantitative characteristics are those which are measurable on a one-dimensional scale and which show continuous variation from one extreme to the other. For the purpose of description they are assessed on a scale of 1 - 9, ranging from the weakest to the strongest expression. An example is leaf length: very short to very long.

Qualitative characteristics are those which show discrete, discontinuous states of expression with no arbitrary limit to the number of states, such as flower type: simple, double. Some characteristics which do not fit into this definition may be handled as qualitative when the states encountered are sufficiently different from one another. An example is mango fruit color: green, yellow, orange, red.

5.4 <u>Combined Characteristics</u>

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

5.5 Observation of Characteristics

Characteristics may either be observed by visual or other assessment or by measurement. Qualitative characteristics are normally recorded visually while quantitative characteristics may be measured. For vegetatively propagated, self-pollinated and apomyctic varieties it is normally considered unnecessary to make measurements in the direct pair-wise comparisons, except in cases of doubt. Quantitative characteristics of hybrids, synthetic varieties and cross-pollinated varieties, however, are normally measured and the data analyzed statistically.

6. Decisions on Distinctness, Uniformity and Stability

In establishing a test, as well as in deciding on its outcome, the genetic structure and mode of propagation of a variety should be fully taken into account. The approach to vegetatively propagated varieties, truly self-pollinated varieties, mainly self-pollinated varieties, cross-pollinated varieties, synthetic and hybrid varieties is necessarily very different.

The General Introduction to the Test Guidelines gives instructions on handling the different cases but the Technical Working Party on Automation and Computer Programs has been working on improved statistical programs which are gradually coming into use.

For measured quantitative characteristics, the TWC had devised the Combined Over-Years Distinctness (COYD) Analysis and the Combined Over-Years Uniformity (COYU) Analysis. These are statistical tools primarily intended to be used for cross-fertilized, seed-propagated varieties. They may, however, prove to be useful for other varieties as well. In cases where certain standards required for the COYD Analysis cannot be met; the TWC recommends use of the long term Least Significant Distance Analysis.

For testing uniformity of vegetatively propagated varieties and truly self-pollinated varieties, new statistical tables were recently accepted, indicating the number of off-types tolerable in samples of various sizes, under different uniformity requirements.

As far as stability is concerned, it is not generally possible to reach decisions with the same certainty within the testing period as in the case of distinctness and uniformity. A variety that has been found to be acceptably uniform, is normally considered to be stable as well. When necessary, stability may be tested by growing a further generation or new seed stock to verify that it exhibits the same characteristics as the material previously supplied.

7. The Introduction of New Methods for Variety Testing

The classical methods of DUS testing are based almost exclusively on morphological and physiological characteristics. In the course of time, however, technology and procedures have been evolving that have broadened the range of characteristics available. In the light of the increasing number of varieties that need to be distinguished, the need has also increased for methods that give faster results, are less influenced by the environment and are more objective.

Various recently developed molecular and biochemical techniques are already being used by breeders for quick identification of existing varieties. Experts in various member States are investigating the possibility of introducing them into the DUS testing system. The Working Group on Biochemical and Molecular Techniques ("BMT") and DNA-Profiling in

Particular has the objective of harmonizing these developments in the different member States in accordance with the UPOV Convention.

8. <u>Conclusion</u>

In conclusion, I wish to emphasize the important role that UPOV is playing in harmonizing, as far as possible, the plant breeders' rights procedures of all its member States. Individual States, by joining forces internationally, are able to attain technical standards not otherwise possible. Assistance, support and information are provided within the Union and member States are able to keep up to date with the latest developments. By cooperation in testing, plant breeders' rights can be granted to a larger range of species in each member State.

DISCUSSIONS

1. <u>Dr. Stephen Muliokela</u> (Zambia) questioned Mrs. Buitendag's reference to "live" reference collections and whether this meant, perhaps, a "botanical garden" or seed given by breeders which were stored in a cold room from where it could be collected every time it was need as a reference in testing.

<u>Mrs. Elise Buitendag</u> (South Africa) answered that both suggestions were relevant. Seed is supplied pursuant to the application for a new variety and enough was kept so that it would last for 10 years for future reference. In the case of fruit trees, they made use of existing fruit orchards of the ARC or plant breeders reference collections.

2. <u>Dr. Muliokela</u> further asked about actual evaluation in the field and which kind of aids were used to assist technicians in making sure that there was consistency in qualitative characteristics and whether there was any technology available to help, since the use of eyes for testing color, for example, could be inconsistent.

<u>Mrs. Buitendag</u> said that they had found the human eye to be very sensitive to colors, but the problem was that people's interpretation of color differed. Within UPOV, some member States had tried to measure color objectively with a colorimeter (Minolta) and a study group had been formed within the ornamental working party which dealt with the color question. This group spent a number of years with this colorimeter trying to secure consistency. It was found that this was not the solution and that the colorimeter could not discriminate adequately between colors. With flowers, however, there are other factors, e.g. carrola thickness, which influence color measurement. Therefore the only danger in the end was that there were not always comparable measurements.

<u>Mrs. R. Klose</u> (Germany) reported that in Germany color cards were sometimes used, but this could also be difficult if there was a slight difference in color used to describe a variety. She suggested that one could make the measurement less subjective if one were to plant similar varieties close together. These differences could then be seen more clearly. If a breeder could not identify his variety when grown alongside similar varieties, his application was refused.

3. <u>Dr. Muliokela</u> asked for an explanation of the elements that went into a combined analysis over years when one refered, for example, to COYD and COYU.

<u>Mrs. Buitendag</u> explained that the analyses were specifically designed for measuring characteristics, i.e. leaf length, where there was a continuous variation. Data was fed into a computer and each characteristic was entered separately and judged separately. Distinctness could then be determined on at least one reliable characteristic.

4. <u>Dr. G.A. Mwakatundu</u> (Tanzania) asked if chemical methods, e.g. electrophoresis, would be suitable for testing new plant varieties.

Mrs. Buitendag answered that, in broad terms, there were many chemical properties within the plant that could be distinguished (or used for testing distinctness). Electrophoresis was, in some ways, in another category. With electrophoresis one looked mainly at protein profiles and iso-enzyme profiles. These were included in the UPOV Guidelines in 1994 for wheat, barley and rye. A consensus showed that these were usable and good characteristics. Electrophoresis can however produce faint bands that are not acceptable. It was breeders and their international organization, ASSINSEL, who objected to electrophoretic characteristics being the sole distinctness criteria. UPOV decided, as a result of this, to put these characteristics as an additional characteristic for testing DUS into an addendum to Test Guidelines. She explained that, at present, it would not be used as the sole criteria for distinctness decisions. It showed that UPOV was working on this issue as well as trying to standardize criteria and methods for electrophoretic testing. She went on to point out that if one were to look at newer technology, e.g. RAPDs and RFLP (DNA testing methods), there appeared to be problems because distinctness could not be determined on the unexpressed part of the DNA (so-called "rubbish DNA.") These techniques picked up very small differences, which UPOV could not accept for distinctness decisions.

<u>Dr. W. Van der Walt</u> (South Africa) commented that the seed trade, both nationally and internationally, was against incorporating biochemical and molecular techniques as mandatory requirements under the UPOV system because it was very expensive and complicated. The breeders, in general, were opposed to these techniques as it forced them to describe their varieties in molecular terms. On the other hand, they did appreciate the technical developments because they were considered valuable in describing some varieties. They were also aware that they should probably separate the UPOV distinctness test from methodology that could be used in legal cases to protect ownership or for rapid identification of their (the breeders) varieties. The international seed trade supported these developments as additional tools along with physical variety descriptions. It was agreed in 1994 in South Africa that electrophoresis be used as an additional tool for describing fifty or more wheat varieties.

5. <u>Dr. R. Ellis</u> (South Africa) asked about the duration and maintenance of vegetative reference collections, i.e. the apple collection which was mentioned, and asked whether it was the breeding organizations responsibility or the body that awarded the plant breeders' rights?

<u>Mr. Greengrass</u> replied that the apple collection mentioned was an example of a national collection from the United Kingdom. The government supported it, but some of the financing came from payments made by plant breeders who made use of the collection. The collection doubled as a genebank and was, therefore, a very good multiple use of one resource.

6. <u>Dr. R. Ellis</u> (South Africa) commented that in order to institute a proper plant breeders right system there had to be proper technical support in order that varieties could be tested. He emphasized the need for proper training in the above and inquired how UPOV overcame such problems, particularly in developing countries.

<u>Mr. Greengrass</u> replied that international cooperation was one option, i.e. Switzerland uses test results of countries in its vicinity and only tests a variety if it has not been tested elsewhere (this being the lowest level of operating a plant variety protection system). In

Southern Africa, one of the smaller countries might decide to have an office (receive applications) and send material to other offices to carry out tests elsewhere for a fee paid by the breeder. It was perfectly possible to operate a protection system without having all the skills/resources for carrying out tests. On the other hand, he continued, in most countries there may be one or two nationally important species, where the work should not be contracted to others. Skills would eventually be developed from working on these species.

7. Dr. W. Van der Walt pointed out that the UPOV Convention did not concern itself with the measurement of agricultural value. In South Africa the Register had the power to remove a variety from the national variety list if he considered that such a variety were a bad influence on agriculture. He added that in South Africa there was value testing for a number of crops. Value tests were often subjective and not easy to evaluate. In South Africa the consensus was that the results should be published and the consumer should be allowed to decide if they wanted a variety. He concluded by asking if there were any quality requirements built into tests which were conducted on subtropical fruits?

<u>Mrs. Buitendag</u> replied that there were no quality requirements. If the characteristic happened to be a performance characteristic, e.g. fruit color, it would be used as a normal morphological characteristic.

<u>Mr. Greengrass</u> commented that UPOV, for DUS testing, tried to use criteria that were independent of the environment. Criteria such as yields are heavily influenced by the environment. UPOV was concerned with ensuring that candidate varieties are different (distinct) from others and not with showing that candidate varieties were better than others.

8. <u>Mr. Saliem Fakir</u> (South Africa) asked what the situation was for forest trees in terms of plant breeders' rights and whether they were subjected to the same testing/conditions as other crops.

<u>Mrs. Buitendag</u> replied that the Technical Working Party for Ornamental Plants and Forest Trees dealt with it and that they came under the same rules. The concept of variety was different in forestry circles and this made forest trees less amenable to protection.

9. <u>Dr. W. van der Walt</u> asked for comments on the following problem. In South Africa there were two issues peculiar to agricultural value testing. The South African plant breeders' rights legislation did not call for agricultural value testing but variety listing did call for it. Because both the tests ran concurrently, one might end up with a plant breeders' rights for a variety, without having the right to sell the variety, which caused problems.

<u>Mr. Greengrass</u> commented that the same situation existed in Europe. It was true of intellectual property systems in general that when one was granted protection, it did not necessarily mean that one had the right to exploit the protected object. A patent may be granted for a pharmaceutical compound but many years of medical testing must be completed before it can be used medically. With plant variety protection one secures protection, but

another national law may exist with the objective of evaluating varieties in the interest of farmers. The two issues were separate.

10. <u>Mr. S. Fakir</u> (South Africa) asked for clarification on testing, the problem of phenotypic expression and the effect of the environment, testing in different locations and how one could standardize tests.

<u>Mrs. E. Buitendag</u> (South Africa) replied that there were usually one or more testing stations for particular species, where all varieties were tested under the same environmental conditions. At these testing stations they always tried to use morphological characteristics that were independent of environment.

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SECOND SESSION: DEVELOPMENTS IN THE FIELD OF PLANT VARIETY PROTECTION

Chairman: Mr. Karl Olov Öster, President, National Plant Variety Board, Stockholm, Sweden

The 1991 Act of the UPOV Convention

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

Plant Breeders' Rights in South Africa

Speaker: Mr. Martin Joubert, Assistant Director, Directorate of Plant and Quality Control, Pretoria, South Africa

THE 1991 ACT OF THE UPOV CONVENTION

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

1. The International Convention for the Protection of New Varieties of Plants("the UPOV Convention") was concluded in Paris in 1961, was revised at Geneva in 1972 and 1978 and was further revised at a Diplomatic Conference held in Geneva from March 4 to 19, 1991. The following 25 States are party to the 1978 Act of the UPOV Convention ("the 1978 Act"): Argentina, Australia, Austria, Canada, Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Israel, Italy, Japan, the Netherlands, New Zealand, Norway, Poland, Slovakia, South Africa, Sweden, Switzerland, the United Kingdom, the United States of America and Uruguay. Belgium and Spain are party only to the 1961 Act. On July 14, 1994, there are accordingly 27 member States of the International Union for the Protection of New Varieties of Plants. However, several States have recently enacted laws which accord with the UPOV Convention, while many other countries are currently studying the UPOV system of plant breeders' rights which has become the most widely recognized system for providing industrial property protection for plant varieties.

2. Advances in technology and the experience of operating the Convention since 1961 led to a number of suggestions for improvements to the Convention. Accordingly, in 1987, the Council of UPOV decided to put in hand the work necessary to effect a revision of the 1978 Act. A meeting of UPOV with international non-governmental organizations (in effect a hearing at which the Council of UPOV listens to the views of international non-governmental organizations on a particular topic) had already been held in 1987 on possible changes to the Convention and influenced the decision of the Council to commence work on a revision. There followed two further meetings with international non-governmental organizations in 1989 and 1990 and seven working sessions in 1988, 1989 and 1990 of the Administrative and Legal Committee of UPOV which was charged by the Council with the task of preparing a draft of a revised Convention. The Council adopted in October 1990 a draft revised Convention ("the Basic Proposal") and decided to hold a Diplomatic Conference in March 1991 to revise the Convention.

3. In addition to the, then 20, member States of UPOV, some 30 observer States participated in the Conference, as well as 24 intergovernmental and non-governmental observer organizations. In excess of 130 proposals for amendments to the Basic Proposal were considered by the Conference which finally adopted unanimously on March 19, 1991, a revised 1991 Act of the UPOV Convention ("the 1991 Act"). Fifteen member States of UPOV signed the 1991 Act either at the conclusion of the Conference or during the period when it remained open for signature. The effect of signature is not, of course, to bind the signatory State but simply represents an acknowledgment of its intention to enact a law based on the Convention and, in due course, to ratify the Convention. It is only the ratification of the Convention by an existing member State, which creates an international legal obligation.

4. Article 37 of the 1991 Act provides that it will come into force one month after five States have deposited their instruments of adherence, provided that at least three of such

instruments are deposited by existing member States of UPOV. After the entry into force of the 1991 Act, the 1978 Act will, in principle, be closed to further accessions. The 1991 Act has not yet (at May 1, 1995) come into effect but will probably do so in the course of 1995 or 1996. The laws of the Russian Federation and Belarus conform with the 1991 Act and the United States of America and Australia have recently modified their national laws so as to conform with the 1991 Act. The European Community has adopted a Regulation which enables the grant of a breeders' right effective throughout the 15 member States of the European Community pursuant to a single application. The Regulation on April 27, 1995.

5. Notwithstanding the coming into force of the 1991 Act, the 1978 Act will remain open for accession by developing countries but only until December 31, 1995. This period of grace in favor of developing countries recognized the fact that there was a sea change in attitude amongst developing countries in relation to the protection of plant varieties, but that it would take some time for those countries who were then (in 1991) expressing interest to actually introduce legislation. It was thought that whilst the 1978 Act was now of great interest to many developing countries as a basis for national legislation, the 1991 Act might in some cases require further study prior to its incorporation into the national laws of some developing countries. The period of grace in favor of developing countries in no way implied that the new Act was not suitable for developing countries. On the contrary, the provisions relating to essentially derived varieties, for example, are of fundamental importance for developing countries.

6. Article 34(1)(b) of the 1991 Act provides for possible membership of UPOV by an intergovernmental organization. This provision was designed to open the possibility of membership by the European Economic Community. The Community is expected to become a member of UPOV on the basis of the Regulations referred to earlier. Article 26(6)(b) which concerns voting in the Council, and Article 6(3) and 16(3) concerning novelty and exhaustion also contain provisions taking into account the possible future membership of the European Community.

7. The structure of the 1978 Act was fundamentally revised in the 1991 Act. In the 1991 Act, the articles are grouped together in ten chapters and the chapters follow a chronological order dealing first with the "General Obligations of the Contracting Parties," followed by "Conditions for the Grant of the Breeder's Right," provisions concerning the "Application for the Grant of the Breeder's Right," The Rights of the Breeder," "Variety Denomination" and "Nullity and Cancellation of the Breeder's Right." The administrative and final provisions of the Convention are contained in the last three chapters.

8. The remainder of this paper examines the text of the 1991 Act in the numerical order of the articles, mentioning the corresponding articles in the old text and the nature of the changes. No attempt is made to deal with every article or with every paragraph of every article. Only those which are of major importance from the substantive standpoint are addressed.

Article 1 - Definitions

9. Article 1 contains "definitions" which are, for the most part, self-explanatory. Item (vi) contains a definition of "variety." The 1978 Act contains no definition of "variety" while the 1961 Act of the Convention provides that "For the purposes of this Convention, the word "variety" applies to any cultivar, clone, line, stock or hybrid which is capable of cultivation and which satisfies the provisions of subparagraph (1)(c) and (d) of Article 6." The provisions of these subparagraphs specify the conditions of homogeneity and stability which must be satisfied by a plant variety prior to a grant of breeders' rights.

10. The definition of "variety" incorporated into the 1961 Act of the Convention is almost, but not quite, synonymous with "variety which is protectable under the Convention." In framing a definition in 1991, it was thought that there should be a clear distinction between the definition of "variety" and a variety which meets the technical criteria of Articles 7, 8 and 9 of the 1991 Act of the Convention so as to be a protectable variety. This is to ensure that a variety with a level of uniformity which is unacceptable for the purposes of a grant of rights may still exist as a "variety" and be taken into account, for example, for the purposes of common knowledge and distinctness under Article 7. The fact that the definition of "variety" is wider than "protectable variety" is made clear by the use of the words "irrespective of whether the conditions for the grant of a breeder's right are fully met" in the introductory phrase.

11. In order to establish an identity for any variety, protectable or otherwise, it must be distinct from other varieties, certain characteristics must be displayed with reasonable uniformity by its component individuals, and it must retain its identity from one generation to the next. The conditions of distinctness, uniformity and stability which are necessary for the purposes of establishing an identity for a unit of plant material to which breeders' rights are to attach, are thus also necessary, but possibly to a more limited extent, when deciding that particular plant material constitutes a variety. The three indents in the definition correspond respectively to the requirements for uniformity, distinctness and stability but were considered to set these requirements at a lower level than that necessary for protection.

12. The expression "plant grouping" used within the definition corresponds to the French "ensemble végétal" and leaves open the question whether a variety must invariably be constituted by more than one whole plant.

Article 2 - The Basic Obligation of Contracting Parties

13. The basic obligation of States party to the Convention that "each Contracting Party shall grant and protect breeders' rights" is imposed by Article 2. "Breeder's right" is defined in Article 1 as "the right of the breeder provided for in this Convention." Accordingly, each State party to the Convention must grant protection on the conditions specified in Chapter III (and subject to no further and different conditions), with the minimum scope of protection required by Chapter V, and in accordance with all other relevant provisions of the Convention. The provisions of Article 2 correspond to the provisions of Articles 1 and 30(3) of the 1978 Act.

14. Unlike the first sentence of Article 2(1) of the 1978 Act, the 1991 Act is silent on the form of the breeder's right. It may take the form of a special <u>sui generis</u> breeder's right, or it

may be called a "patent" or given any other designation provided it has the minimum substance provided for in the Convention. The 1991 Act equally contains no provision corresponding to the second sentence of Article 2(1) of the 1978 Act (the so-called "ban on double protection") so that a Contracting Party is, so far as the 1991 Act is concerned, free to protect varieties, in addition to the grant of a breeder's right, by the grant of other titles, particularly patents. A member State exercising this freedom to grant patents in addition to the breeder's right is free to decide whether an applicant must choose between a breeder's right and a patent, that is, if he applies for one, he cannot apply for the other, or whether he can apply for and be granted both the breeder's right and the patent. If, for any given variety, cumulative protection is left to the legislation and courts of the member State where the titles were obtained and is not regulated by the Convention.

Article 3 - Genera and Species to be Protected

15. Article 3 corresponds to Article 4 of the 1978 Act and is concerned with the genera and species to be protected. The system of the 1978 Act is to require member States to protect a minimum of five genera or species on accession to the Convention, and to require that thereafter member States protect genera or species on a progressive basis, leading to a minimum of 24 genera or species after eight years. Article 4 of the 1978 Act does contain a provision that member States should undertake to adopt all measures necessary for the progressive application of the Convention to the largest possible number of botanical genera and species, but in no way imposes on member States a clear commitment to protect the whole plant kingdom. Article 3 of the 1991 Act, however, requires existing member States to protect all plant genera and species five years after becoming bound by the new text and requires new member States to protect all plant genera and species to protect all plant genera and species after they become bound by the 1991 Act, so that over time a worldwide UPOV system of plant variety protection will emerge which requires all member States to protect all plant genera or species.

16. The emergence of such a system has some interesting implications for the future, particularly in view of the increased scope of protection which is now provided in Article 14 of the new text. If Sweden, for example, decides to modify its national law and to ratify the 1991 Act, it should in due course become possible to protect a new banana variety in Sweden, notwithstanding the fact that the variety will never be grown there, but with a view to taking action against imports derived from the unlicensed propagation of the variety in countries where plant variety protection is not available. Thus far, Sweden, as an importing country, has probably been uninterested in the protection of bananas. The absence of any protection of the harvested material of a plant variety in importing countries has meant that it has also been a matter of no concern to exporting countries without breeders' rights if varieties. This situation may well change in the future in relation to species where the harvested material of the variety in the relation to species where the harvested material of the future in relation to species where the harvested material of the variety and the relation to species where the harvested material of the variety moves in international trade.

Articles 5, 6, 7, 8 and 9 - Conditions for the Grant of the Breeder's Right

17. These articles contain the conditions for the grant of a breeder's right and correspond to Article 6 of the 1978 Act of the Convention. There have been extensive changes in language but, except where some express reference is made below, there is no specific intention to change the substance.

18. Article 6 of the new text deals with the novelty-destroying prior commercialization of a variety. In the existing text, a variety must not have been offered for sale or marketed with the agreement of the breeder prior to the filing of an application for protection in the territory where the application is filed or, where the law of the relevant State so provides, for one year prior to such filing. The new text requires all member States to make provision in their laws for this one-year grace period; it is no longer optional.

19. The provisions of Article 6(1)(b) of the 1978 Act state that the <u>variety</u> must not have been <u>offered for sale or marketed</u> with the agreement of the breeder prior to the date of application. The provisions of Article 6 of the 1991 Act state that <u>propagating or harvested</u> <u>material</u> of the variety must not have been <u>sold or otherwise disposed of to others</u> by or with the consent of the breeder for the <u>purposes of exploitation of the variety</u>. The language of the 1991 Act is very different from that of Article 6(1)(b) of the 1978 Act and may have the effect of catching certain commercial activities with varieties that fall outside the corresponding provisions in the existing laws of some UPOV member States. An example might be the use of an inbred line as the parent of a hybrid where the inbred line was not itself sold or marketed. It has been claimed that the use of an inbred in this way, perhaps protected by trade secrecy, would not debar its breeder from applying for protection for the inbred line many years after it was first used for commercial purposes.

20. Paragraph (3) of Article 6 of the 1991 Act makes reference to special rules that may be adopted where sales are effected in the member States of an intergovernmental organization. This provision relates to the possible future UPOV membership of the EEC, and enables the EEC and its member States to enact provisions which will make a sale in one EEC member State a novelty-destroying event for all EEC member States so as to conform with the concept of the single market.

Article 7 of the 1991 Act deals with distinctness and requires simply that a variety must 21. be clearly distinguishable from any other variety whose existence is a matter of common knowledge at the time of the filing of the application. The language of the existing text, by which a variety must be clearly distinguishable by one or more important characteristics from any other variety, has been abandoned since it was thought to be needlessly ambiguous. The word "important" has frequently suggested to persons reading the text of the 1978 Act for the first time that a variety must, to be protectable, be distinct from existing varieties by some feature related to merit. This has never been the case. The UPOV Convention affords protection to any variety which is clearly distinguishable from other varieties irrespective of any judgment concerning its worth. The view has been consistently taken over the years in UPOV circles that the worth or merit of a variety varies too greatly with time and environment to be used as a criterion for the grant of protection in an international intellectual property rights' system. The simplified new text avoids the ambiguity of the word "important."

22. The 1978 Act provided a non-exhaustive list of examples of common knowledge which included "an entry in an official register of varieties already made or in the course of being made," which plainly does not constitute common knowledge in the normal sense since the relevant information may not necessarily be publicly available. Accordingly, Article 7 in the new text leaves the notion of common knowledge undefined and refers only to the specific instances of applications for protection or entry in an official register where, for the purposes of the Convention, common knowledge is deemed to exist notwithstanding that the information may not be generally available.

23. An application for the grant of a breeder's right or for the entering of a variety in an official register of varieties does not, however, make the variety in question a matter of common knowledge unless the application leads to the granting of a breeder's right or the entering of the variety in an official register of varieties. This is to avoid a situation where the system becomes cluttered with large numbers of "varieties" which were the subject of applications which have been refused or withdrawn and which no longer exist since they have been discarded by their breeders.

24. The language of Articles 8 and 9 of the 1991 Act, dealing with uniformity and stability respectively, is different from that in the corresponding provisions of the 1978 Act but there is no intended change in substance.

Article 12 - Examination of the Application

25. Article 12 of the 1991 Act deals with the examination of the application and corresponds to Article 7 of the 1978 Act. There is some change of emphasis in the new text in that it expressly makes reference to the authority responsible for the test "taking into account the results of growing tests or other trials which have already been carried out." The eventual extension of protection to the whole plant kingdom under Article 3 of the 1991 Act will mean that examining authorities may be called upon to examine plant varieties of any species for distinctness, uniformity and stability, including species which are rare or unknown or in relation to which the authority has little or no knowledge or experience. Clearly in these circumstances, the authority may not itself be in a position to conduct the necessary tests and may find it necessary to ask the breeder to conduct tests or to take into account data which has been generated by the breeder. In cases of this kind, tests conducted by the breeder may well be acceptable provided that the data in question is presented in a common format and is generated by tests which follow the principles established in the General Introduction to the UPOV Guidelines for the Conduct of Tests for Distinctness, Uniformity and Stability, and that a sample of the variety is made available to the authority at the date of application.

Article 13 - Provisional Protection

26. Provisional protection is dealt with in Article 7(3) of the 1978 Act which does not, however, make it obligatory for member States to provide provisional protection. Article 13 of the 1991 Act, however, obligates member States to make provision for protecting the interests of the breeder during the period between the filing or the publication of an application and the subsequent grant. The Article requires Contracting Parties to ensure that,

as a minimum, the holder of the breeder's right should be entitled to equitable remuneration in respect of acts which will require the breeder's authorization once the right has been granted. The Article reflects the present practice of some countries by permitting Contracting Parties to provide that the provision of protection shall only take effect in relation to persons whom the breeder had notified of the filing of the application.

Article 14 - Scope of the Breeder's Right

27. Article 5 of the 1978 Act provides that the prior authorization of the breeder "shall be required for:

- the production for purposes of commercial marketing,
- the offering for sale,
- the marketing

of the reproductive or vegetative propagating material, as such, of the variety." The article further provides that "vegetative propagating material shall be deemed to include whole plants" and that "the right of the breeder shall extend to ornamental plants or parts thereof, normally marketed for purposes other than propagation, when they are used commercially as propagating material in the production of ornamental plants or cut flowers."

28. The fact that the breeder's authorization is only required for the production of propagating material "for purposes of commercial marketing" means that production of propagating material that is not intended for marketing, but only for use on the farm where it was produced, falls outside the scope of protection. This has the effect of creating implicitly the so-called "farmer's privilege" whereby farmers may replant on their farms propagating material from the previous year's harvest.

29. Article 14(1) of the 1991 Act provides that, in respect of the propagating material of a protected variety, any production, reproduction (multiplication), conditioning for the purpose of propagation, offering for sale, selling or other marketing, exporting, importing or stocking for any of these purposes shall require the authorization of the breeder. Accordingly, the basic scope of the protection extends to <u>all</u> production or reproduction (multiplication) without a reference to its purpose and, unlike the 1978 Act, does not have the effect of creating, by implication, a "farmer's privilege."

30. The very widely differing natures of the agricultural industries of UPOV member States and the varying political situations in these States have nonetheless made it essential to include in the new Act a provision entitling States on an optional basis to except the planting of farm-saved seed from the requirement for the breeder's authorization. The provision in question is contained in Article 15(2). It provides that "each Contracting Party may, within reasonable limits and subject to the safeguarding of the legitimate interests of the breeder, restrict the breeder's right in relation to any variety in order to permit farmers to use for propagating purposes, on their own holdings, the product of the harvest which they have obtained by planting, on their own holdings, the protected variety." The structure of the provision should ensure that countries give careful thought to the interests of plant breeders when exercising this option. It is hoped that States will examine the issues involved on a

31. Apart from the special provision relating to the production of ornamental plants or cut flowers, the mandatory minimum scope of protection under Article 5 of the 1978 Act is limited to the reproductive or vegetative propagating material, as such, of the variety. Paragraph (4) of Article 5 does provide that member States may grant to breeders, in respect of certain botanical genera or species, a more extensive right than that otherwise provided in Article 5, extending, in particular, to the marketed product. Few States have taken advantage of this optional provision. A major question debated in the course of the revision process was whether the scope of the breeder's right should be extended in a more general way to the harvested material of the protected variety or to products produced by processing the harvested material.

32. The Diplomatic Conference decided the above question positively. Article 14(2) of the 1991 Act does make provision for the scope of the breeder's right to extend to harvested material including entire plants and parts of plants where these have been obtained through the unauthorized use of propagating material of a protected variety, but qualifies the scope by providing that this scope of protection exists, "unless the breeder has had reasonable opportunity to exercise his right in relation to the propagating material of the variety."

33. The majority of the member States of UPOV who voted in the Diplomatic Conference on the text of Article 14(2) were not prepared to extend to the breeder an untrammeled choice between the exercise of his right in relation to the propagating material and its exercise in relation to the harvested material. They were not, for example, prepared to permit the breeder to be totally free to exercise his intellectual property right over the grain instead of the seed. There was, however, general agreement in the Diplomatic Conference that a breeder needed to have a right exercisable over the harvested material of his variety when he had had no opportunity to exercise a right in relation to the propagating material. The most commonly quoted example of the breeder being unable to exercise his right was that of the piratical use of a breeder's variety in another country, perhaps a country which makes no provision for plant variety protection, followed by a subsequent import of harvested material of the variety into a country where the variety is protected. A further example would be the exercise by the breeder of his right in relation to any harvested material which arises from an infringement, of which he was unaware, of his rights in respect of propagating material.

34. Article 14(2) provides that the breeder <u>has</u> a right to protection in relation to harvested material "<u>unless</u> he has reasonable opportunity to exercise his right in relation to the propagating material." Accordingly, it is the alleged infringer who will usually bear the burden of establishing that the breeder has indeed had reasonable opportunity to exercise his right in relation to the propagating material of the variety.

35. Article 14(3) of the 1991 Act provides for the further extension of the right of the breeder to products made directly from harvested material. This provision is not, however, part of the mandatory minimum scope of protection under the 1991 Act. States adhering to the 1991 Act may choose whether they wish to extend the breeder's right in accordance with

Article 14(3). Under the Article, the authorization of the breeder is required to produce, sell, market, etc. any product made directly from harvested material, provided that the harvested material itself results from infringement. Once again, the exercise by the breeder of any right under the Article in relation to products made directly from harvested material exists "unless the breeder has had reasonable opportunity to exercise his right in relation to the harvested material." The provisos attached to Article 14(2) and (3) together constitute what has been called a "cascade." The idea of those who promote the notion of a cascade is that the breeder should only exercise his right in relation to the propagating material and that he should only exercise his right in relation to a product made directly from harvested material if he has been unable to exercise his right in relation to the harvested material if he has been unable to exercise his right in relation to the harvested material if he has been unable to exercise his right in relation to the harvested material if he has been unable to exercise his right in relation to the harvested material if he has been unable to exercise his right in relation to the harvested material if he has been unable to exercise his right in relation to the harvested material.

36. As already mentioned, interesting future consequences arising from the extended scope of protection in the 1991 Act can be envisaged once protection extends to the whole plant kingdom.

Article 14(5) - Essentially Derived Varieties

37. Under the provisions of Article 6(1)(a) of the 1978 Act, any variety is protectable which, inter alia, is clearly distinguishable, at the time of application, by one or more important characteristics from other commonly known varieties and which is sufficiently uniform and stable. Article 5(3) of the 1978 Act provides that a protected variety may be used as an initial source of variation for the purpose of creating other varieties. The two provisions taken together create a situation in which an existing protected variety may be used as a source of initial variation and a variety selected therefrom may be freely exploited by the selector free of any obligation to the breeder of the protected variety, provided that the selection is clearly distinguishable by one or more important characteristics from the protected variety. Since the word "important" in this context has been construed to mean "important for the purposes of making a distinction" and not "important in the sense of having value," this has meant that a person selecting a mutant or a minor variant from an existing variety or inserting an additional gene into it by back-crossing or some other procedure can protect the resulting variety without rewarding the original breeder for his contribution to the final result. Typical examples are the selection of a color mutant from an ornamental variety, the insertion of a single gene into a maize line by back-crossing (under the favorable conditions of the tropics, multiple back-crosses can be effected in one year) and more recently, the insertion of a single gene by genetic engineering. The fact that the 1978 Act does not enable the breeder to prevent breeding approaches of this kind has been criticized as unjust by industrial circles and the 1991 Act remedies this situation by introducing the principle of "essential derivation." Article 14(5) of the 1991 Act provides that a variety which is essentially derived from a protected variety cannot be exploited without the authorization of the breeder of the protected variety. A variety is deemed to be essentially derived from another variety ("the initial variety") for this purpose when

(a) it is predominantly derived from the initial variety or from a variety that is itself predominantly derived from the initial variety while retaining the expression of the essential characteristics that result from the genotype or combination of genotypes of the initial variety;

(c) except for the differences which result from the act of derivation, it conforms to the initial variety in the expression of the essential characteristics that result from the genotype or combination of genotypes of the initial variety."

38. Article 14(5) provides a non-exhaustive list of examples of acts that may result in essential derivation including the selection of a natural or induced mutant, or of a somaclonal variant, the selection of a variant individual from plants of an initial variety, back-crossing, or transformation by genetic engineering.

39. It is not envisaged that a determination concerning the essential derivation of a variety will be made by an examining office as part of the grant procedure, but rather that the question will be resolved between plant breeders by agreement or in the last resort through litigation.

The existence of the new principle should ensure in future that those working as 40. innovators in the field of plants will reach agreement before they undertake a program of activity which could result in varieties that are essentially derived from protected varieties. It is hoped that in the vast majority of cases amicable arrangements will be made between plant breeders and/or biotechnologists. If a plant breeder inserts a gene falling within the claims of an invention relating to genetic information (a "patented gene") into his variety, the resulting variety could fall within the scope of the patent enabling the patentee, in effect, to prohibit the exploitation of the variety. If, on the other hand, the patentee inserts the patented gene into the same variety, the breeder of the variety has no possibility at present to forbid the exploitation of the modified variety. In future, if a patentee of a gene inserts his patented gene into a protected variety, there will exist the possibility that the modified variety will be essentially derived and fall within the scope of protection of the protected variety. It is thought that the new balance established between the two systems in this way will facilitate the exchange of technology between plant breeders and biotechnologists. Plant breeders and biotechnologists are described here as if they pursue fundamentally separate activities. UPOV is well aware that their activities may be pursued in one and the same organization or by one person but it does still help, occasionally, for present purposes to talk of the two activities separately. It should be noted that there is no suggestion in the essential derivation provision that the breeder of an essentially derived variety should be able to force the breeder of the initial variety to grant a license through some compulsory license procedure. This possibility was considered and rejected in the course of the revision process.

Article 15 - Exceptions to the Breeder's Right

41. A description has already been given, in connection with the scope of protection, of the provisions of Article 15(2) relating to an <u>optional</u> exception from the scope of protection in favor of certain farmers in certain circumstances. Article 15(1)(iii) provides that "acts done for the purpose of breeding other varieties" are <u>compulsorily</u> excepted from the breeder's right. This provision reproduces the substance of Article 5(3) of the 1978 Act whereby the authorization of the breeder is not required for the utilization of a protected variety as an initial source of variation for the purpose of creating other varieties, thus creating the so-called

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"breeder's exemption." This is a very important feature of the Convention and is strongly supported by plant breeders and by interested circles generally. The breeder's exemption principle was strongly reaffirmed by the Diplomatic Conference. Some parties have sought to suggest that the introduction of the principle of essential derivation represents a fundamental departure from the breeder's exemption. Essential derivation is not seen in this light in UPOV. A variety will be essentially derived from another only when it retains the expression of the essential characteristics that result from the genotype or combination of genotypes of the initial variety. Accordingly, a variety will only be caught by the essential derivation provision when it resembles the initial variety very closely and uses virtually the whole genetic structure of the initial variety apart from specific limited modifications. Any variety may still be used under the 1991 Act of the Convention for the purpose of breeding other varieties and, unless they fall within the limited category of varieties which are essentially derived, such newly bred varieties may be freely exploited. The nature of the essential derivation principle is such that any breeder who embarks upon a program which will result in a variety which is essentially derived, will know what he is doing and why he is doing it and will either reach agreement with the breeder of the initial variety or will take the risk that the time and effort of his program will be wasted if the breeder of the initial variety declines to grant a license.

42. The new principle is seen in UPOV circles as an important extension of the zone of protection around a protected variety. This zone will in future comprise the minimum distance that results from the existing distinctness rule together with an additional zone created by the essential derivation principle.

Article 16 - Exhaustion of the Breeder's Right

43. The breeder's right does not extend to acts concerning any material of the protected variety which has been sold or otherwise marketed by the breeder or with his consent, unless such acts

(i) involve further propagation of the variety in question, or

(ii) involve an export of material of the variety, which enables the propagation of the variety, into a country which does not protect varieties of the plant genus or species to which the variety belongs, except where the exported material is for final consumption purposes.

The breeder's right to prohibit propagation of the variety is thus never exhausted.

Article 19 - Duration of the Breeder's Right

44. Article 19 adjusts the minimum period of the breeder's right from 18 years for trees and vines and 15 years for all other species to periods of 25 years and 20 years respectively for these same categories. In large measure, these adjustments reflect the existing practice of member States. The substitution of the 20-year period for the 15-year period of protection will have the effect that the period of protection available for the majority of applicants in the plant breeders' rights system will be the same as that available in the patent system.

Administrative and Final Provisions

45. For the most part, the administrative and final provisions of the 1991 Act, which are contained in Articles 21 to 42, reproduce the substance of the 1978 Act.

46. Article 35 of the 1991 Act is worthy of comment. It provides that any State which, at the time of becoming a party to the 1991 Act, is a party to the Act of 1978 and which, as far as varieties reproduced asexually are concerned, provides for protection by an industrial property title other than a breeder's right shall have the right to continue to do so without applying this Convention to those varieties. This provision is designed, as was Article 37 of the 1978 Act, specifically for the situation of the United States of America, which protects asexually reproduced plant varieties, other than potatoes and Jerusalem artichokes, by a special form of plant patent (which does not strictly accord with the provisions of the UPOV Convention) and which protects sexually reproduced varieties (other than hybrids) by the Plant Variety Protection Act (which does accord with the provision of the UPOV Convention). Accordingly, unless the United States of America changes its law rather fundamentally, it will not be in a position to meet the requirements of Articles 2 and 3 which will ultimately require it to grant and protect breeders' rights (that is rights which accord with the UPOV Convention) for all plant genera and species. Article 35 of the 1991 Act, which can only apply to the United States of America, enables it in large measure to continue with its present system, unless or until, of course, it decides to rationalize the present provisions of its law.

DISCUSSIONS

1. <u>Dr. S. Muliokela</u> (Zambia) asked about the farmer's privilege and what it meant in practice with the new 1991 Act of the UPOV Convention.

<u>Mr. Barry Greengrass</u> (UPOV) answered that, as far as the 1991 Act was concerned, each country is free to make its own rules concerning the planting of farm saved seed. The new law of the USA contained a completely unqualified farmers' privilege. The new European Regulation, on the other hand, was more restricted. Governments were free to make an appropriate decision in the light of their own agricultural conditions.

<u>Dr. W. van der Walt</u> (South Africa) commented that in South Africa no specific provision had been made in its legislation for farmers' rights. It was a question of educating farmers and showing that seed quality could deteriorate. Under protection legislation, seed should not be allowed to be retained for sale, otherwise the farmers would no longer be farmers, but seed traders.

2. <u>Dr. J. Luhanga</u> (Malawi) asked two questions, firstly, in relation to plant breeders' rights and the cost of implementation, what assistance UPOV could give Malawi in terms of support when trying to develop a system of their own, and, secondly, in Malawi, where 99% of farmers used their own seed, what the structure would be of a) building a seed industry, b) true breeding programs and c) enforcing breeders rights in Malawi.

<u>Mr. Greengrass</u>, in reply to the first question, said that UPOV was a free-standing international organization not part of the UN system. It had no mission, as such, to participate financially in providing technical assistance to developing countries. UPOV would be happy, however, to assist with legislation at no cost to Malawi. This was a standard service available to all countries. The initiative in this connection had to come from the country itself, and not from UPOV. UPOV could also arrange training opportunities, but could not meet travel and subsistence expenses of trainees out of its regular budget.

With regard to the second question, <u>Mr. Greengrass</u> suggested that the reason why 99% of farmers in Malawi retained their seed was the consequence of the nature of agriculture in Malawi, dominated by subsistence farmers who did not participate in cash markets. Plant variety protection was not particularly relevant in these circumstances. Concerning the question of the cost of enforcement, he noted that a plant breeder's right was a private right and it was, therefore, the responsibility of the breeder to enforce his right and to carry the financial burden of doing so.

3. <u>Dr. Luhanga</u> asked whether, if a neighboring country had taken some seed or vegetative material, which was not registered, from a country, whether there would be any reciprocation of rights to take civil action in that country, particularly if that country had no legislation of its own and was not a UPOV member State.

<u>Mr. Barry Greengrass</u> (UPOV) answered that if Malawi or its neighboring countries did not have laws protecting plant varieties, no action could be taken.

PLANT BREEDERS' RIGHTS IN SOUTH AFRICA

by

Mr. Martin Joubert, Assistant Director, Directorate of Plant and Quality Control, National Department of Agriculture, Pretoria, South Africa

The Significance of Plant Breeders' Rights

Plant Breeder's Rights means the acquisition of a lawful right by the owner of a new variety of a kind of plant which has been declared in terms of the Plant Breeders' Rights Act, 1976 (Act No. 15 of 1976) to multiply and sell propagating material of his variety for a prescribed period of sole right or to license other users to also multiply and sell propagating material of his variety on a basis of payment of royalties for the material which is sold. No person may sell propagating material during the period of protection without written approval of the holder of the plant breeder's right. The owner of the right therefore has the opportunity to exploit the local as well as overseas markets. Only after the expiration of the plant breeder's right does the variety become public property and may be utilized by anybody.

The breeding of a new variety is extremely time consuming and expensive and the acquisition of a plant breeder's right is the only effective means how a breeder can obtain financial remuneration in order to enable him to finance his breeding program. The breeder of a new variety is also the best person to maintain his variety and the onus therefore rests upon him to do this.

The Advantages of Plant Breeders' Rights for South Africa

The institution of plant breeder's rights in South Africa served as a stimulus and incentive for local plant industries (seed industry as well as nurseries) as access then became possible to obtain new, better and exciting varieties from overseas. Then, as it still is today, owners of varieties are very reluctant to supply their varieties to anybody if such varieties cannot be protected by means of plant breeder's rights.

Plant Breeders' Rights are of the utmost importance to South Africa especially as the country has a very low rainfall and every drop of water has to be utilized to the full and yields should therefore be as high as humanly possible. South Africa's rapidly growing population constantly demands more food and the country has therefore striven to breed varieties with better quality, higher yield and better disease tolerance or resistance at all times.

Historical Background

The International Convention for the Protection of New Varieties of Plants (UPOV) came into force in 1968. The Republic of South Africa became the tenth signatory to this Convention in November 1977 and is at present still the only country in Africa which is a member.

There are 27 members of UPOV at present and quite a few countries who are aspiring to become members in the near future. The present UPOV countries are Argentina, Australia,

Austria, Belgium, Canada, Czech Republic, Denmark, France, Finland, Germany, Hungary, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Poland, Slovakia, South Africa, Spain, Sweden, Switzerland, United Kingdom, United States of America and Uruguay.

The Directorate of Plant and Quality Control of the Department of Agriculture is the responsible authority in the Republic of South Africa for the granting of plant breeder's rights.

Kinds of Plants for Which Plant Breeder's Rights can be Obtained

At present, plant breeder's rights can only be obtained for the kinds of plants which have been declared in terms of the Plant Breeder's Rights Act, 1976 (Act No. 15 of 1976). When the new revised Act comes into force in the near future, rights will have to be granted to all kinds of plants for which applications are submitted.

At present plant breeder's rights can be obtained for 133 different kinds of plants - 47 ornamentals, 19 vegetables, 27 fruit crops and 40 agricultural crops. In the new South Africa since sanctions have been lifted, the Directorate is inundated with applications for the declaration of new kinds of plants and at present a further 57 kinds of plants (53 ornamentals) are in the process of being declared. Most of the economically important crops have already been declared and this is the reason why there is such an abundance of ornamentals.

Principle Features of the New Draft South African Act which has been Revised so as to Conform with the 1991 Act of the UPOV Convention

Conditions for the Grant of the Breeders' Right

1. Criteria to be Complied with

A breeder's right shall be granted if the variety is:

- (a) new;
- (b) distinct;
- (c) uniform; and
- (d) stable.

2. <u>Other Conditions</u>

The grant of the breeder's right shall not be subject to any further or different conditions, provided that:

- (a) the variety is designated by an acceptable denomination;
- (b) the applicant complies with the formalities provided for by the law of South Africa;
 - (c) all the required fees have been paid.

Individual Criteria

(a) <u>Novelty</u>

The variety shall be deemed new if at the date of the filing of the application for a breeder's right, propagating material or harvested material of the variety has not been sold or otherwise disposed of to others, by or with the consent of the breeder, for purposes of exploitation of the variety:

- (i) in South Africa, earlier than one year before that date; and
- (ii) in a territory other than that of South Africa earlier than four years or, in the case of trees or vines, earlier than six years before the said date.

(b) <u>Distinctness</u>

A variety shall be deemed distinct if it is clearly distinguishable from any other variety of the same kind of plant, whose existence is a matter of common knowledge at the time of the filing of the application.

The filing of an application for the granting of a breeder's right or for the entering of another variety in an official register of varieties, in any country, shall be deemed to render that other variety a matter of common knowledge from the date of the application - provided that the application leads to the granting of the breeder's right or to the entering of the other variety in the official register of varieties.

(c) <u>Uniformity</u>

A variety shall be deemed uniform if, subject to the variation that may be expressed from the particular features of it's propagation, it is sufficiently uniform in it's relevant characteristics.

(d) <u>Stability</u>

A variety shall be deemed stable if it's relevant characteristics remain unchanged after repeated propagation or, in the case of a particular cycle of propagation, at the end of each such cycle.

Right of Priority

A breeder who has filed an application for protection in another country, shall enjoy a right of priority for a period of 12 months in South Africa, computed from the date of filing of the first application.

In order to benefit from the right of priority, the breeder shall in the subsequent application claim the priority of the first application. The Directorate may require the breeder to furnish it with true certified copies of the documents of the first application within three months of the subsequent application, and samples or other evidence that the variety in the two applications are the same.

A breeder shall be allowed two years after the period of priority, or where the first application is rejected or withdrawn, in which to furnish the authority where the subsequent application was filed, any necessary information, documents or material required for examination of the variety.

Rejection of the first application shall not constitute grounds for rejecting subsequent applications.

Examination of Applications

Any decision to grant a breeder's right shall require an examination for compliance with the necessary conditions. The Directorate may grow the variety, or cause the variety to be grown or take into account the results of growing tests or other trials which have already been carried out.

In some cases test results may also be bought from other member countries. South Africa, for example, buys Chrysanthemum results from the United Kingdom.

Provisional Protection

An applicant may apply for provisional protection when submitting an application for plant breeder's rights and in such a case he undertakes in writing not to sell propagating material of the variety during the period of provisional protection, except for purposes of multiplication or testing.

Advantages of Provisional protection

During the period of provisional protection the variety in question is fully protected as if a plant breeder's right had already been granted. Provisional protection is strongly recommended for crops which take longer than one year to be tested.

Expiry of Provisional Protection

There is no fixed period, but provisional protection expires as soon as a plant breeder's right is granted or if the application is rejected.

Rights of the Breeder

- 1. Acts in Respect of the Propagating Material
 - (a) The following actions in respect of the propagating material of the protected variety shall require the authorization of the breeder:
 (i) meduation or remeduation (multiplication);
 - (i) production or reproduction (multiplication);
 - (ii) conditioning for the purpose of propagation;
 - (iii) offering for sale;
 - (iv) selling or other marketing;
 - (v) exporting;
 - (vi) importing; and
 - (vii) stocking for any of the purposes mentioned in (i) to (vi) above.
 - (b) The breeder may make his authorization subject to conditions and limitations.

2. Acts in Respect of the Harvested Material

Any of the items mentioned in (i) to (vi) of paragraph 1(a) above in respect of harvested material, including entire plants and parts of plants obtained through the unauthorized use of propagating material of the protected variety, shall require the authorization of the breeder, unless the breeder has had reasonable opportunity to exercise his right in relation to the said propagating material.

3. Acts in Respect of Certain Products

In South Africa, the Minister of Agriculture may, by notice in the Gazette, provide that the acts referred to in 1(i) to (vii) of paragraph 1(a) in respect of products made directly from harvested material of the protected variety, shall require the authorization of the breeder, unless the breeder has had reasonable opportunity to exercise his right in relation to the said propagating material.

4. Essentially Derived Varieties

- (a) The provisions of paragraphs 1 to 4 shall also apply in relation to:
 - (i) varieties which are essentially derived from the protected variety, where the protected variety is not itself an essentially derived variety;

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- (ii) varieties which are not clearly distinguishable from the protected variety; and
- (iii) varieties whose production requires repeated use of the protected variety.
- (b) A variety shall be deemed to be essentially derived from another variety when:
 - (i) it is predominantly derived from the initial variety, or from a variety that is itself predominantly derived from the initial variety, while retaining the expression of the essential characteristics that result from the genotype or combination of genotypes of the initial variety;
 - (ii) it is clearly distinguishable from the initial variety; and
 - (iii) except for the differences which result from the act of derivation, it conforms to the initial variety in the expression of the essential characteristics that result from the genotype or combination of genotypes of the initial variety.

(c) Essentially derived varieties may be obtained by the selection of a natural or induced mutant, or of a somaclonal variant, the selection of a variant individual from plants of the initial variety, backcrossing or transformation by genetic engineering.

Exceptions to the Breeders' Right

The following acts fall outside the scope of the breeders' right:

- (i) acts done privately and for non-commercial purposes;
- (ii) acts done for experimental purposes; and
- (iii) acts done for the purpose of breeding other varieties.

Duration of the Breeder's Right

The period of the right shall not be shorter than 20 years from the date of the grant of the right. For trees and vines the period shall not be shorter than 25 years.

At present the period of the breeder's right in South Africa varies between 15 and 25 years.

Denomination of a Variety

An acceptable denomination must be proposed by the applicant. If the Registrar considers such a proposed name to be unacceptable, the applicant must propose a new denomination.

It is extremely important that the same variety denomination be used in every country where applications are submitted--it is completely unacceptable that different names are used in different countries.

It is a transgression of the Plant Breeders' Rights Act if different denominations are used for the same variety, and also if the same denomination is used for different varieties.

The denomination must enable the variety to be identified. It may not consist solely of figures except where it is an established practice for designating varieties. It must however always be different from every other denomination of an existing variety of the same kind of plant.

Nullity of the Breeder's Right

1. <u>Reasons of nullity</u>

The Directorate shall declare the a breeders' right granted by it null and void when it is established:

- (i) that the conditions laid down were not complied with at the time of the grant of the right;
- (ii) that, except where the grant of the breeder's right has been essentially based upon information and documents furnished by the breeder, the conditions laid down were not complied with at the time of the grant of the right; and
- (iii) that the breeder's right has been granted to a person who is not entitled to it, unless it is transferred to the person who is so entitled.

2. Exclusion of Other Reasons

No breeder's right shall be declared null and void for other reasons as those referred to above.

Cancellation of the Breeders' Right

1. <u>Reasons for Cancellation</u>

(a) The Directorate may cancel a breeder's right granted by it if it is established that the conditions as laid down are no longer fulfilled.

(b) Furthermore, the Directorate may cancel a breeder's right granted by it if, after being requested to do so and within a prescribed period,

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- (i) the breeder does not provide the Directorate with the information, documents or material deemed necessary for verifying the maintenance of the variety;
- (ii) the breeder fails to pay such fees as may be payable to keep his right in force (annual fees); and
- (iii) the breeder does not propose another suitable denomination where the denomination of the variety is canceled after the grant of the right.

2. Exclusion of Other Reasons

No breeder's right shall be canceled for reasons other than those referred to in paragraph 1.

Submission of Applications for a Plant Breeder's Right

Before an application will be accepted and examined by the Directorate, it must be complete, and the following must be submitted:

- (a) an acceptable proposed denomination for the variety;
- (b) fully completed application form;
- (c) fully completed technical questionnaire;
- (d) the required quantity of propagation material;
- (e) fees must be paid in full; and

(f) if the applicant is not the breeder or owner of the variety permission from the owner or breeder that the applicant may apply for the plant breeders' right.

General

Membership of UPOV has the advantage that a person shall enjoy the same treatment in every UPOV country. The two main objectives of UPOV are cooperation and standardization. It is very important to bear in mind that a plant breeder's right is only valid in the country in which it is granted and if protection is required in more than one country, separate applications must be filed in each country.

It is also very important to keep in mind that if an applicant is not resident in the Republic of South Africa, that the application must be submitted by a local agent on his behalf. In other words this agent must have a local address to which all correspondence can be forwarded.

South Africa--General

During the initial years after becoming a member of UPOV, the Directorate made use of the experimental farms of the Research Component of the Department of Agriculture to carry out it's experiments and examinations (The Research Component of the Department later became the Agricultural Research Council, which is a parastatal Organization). During later years however the Directorate bought it's own farm at Roodeplaat, which is adjacent to the Vegetable and Ornamental Research Institute and also acquired an experimental farm in Stellenbosch in the Cape as result of rationalization which took part in the Department of Agriculture. At present the Directorate carries out it's functions at these two farms as well as in Nelspruit in the Eastern Transvaal where use is made of the farm of the Agricultural Research Council.

The following crops are planted and evaluated at these three evaluation centers:

1. <u>Roodeplaat</u>:

Mainly summer crops are planted here - maize, grain sorghum, sunflower, soyabean, groundnuts, vegetable crops like tomatoes, short-day onions, beans, lucern, ornamental crops like roses and annual ornamentals.

The personnel at Roodeplaat consists of 16 professional officers and agricultural technicians and 32 laborers.

The farm consists of approximately 100 hectares of arable lands and approximately 40 hectares of crops are planted each year.

2. <u>Stellenbosch</u>:

The most important crops which are planted here are deciduous fruit, grapes, ornamentals (Proteas as well as annual ornamentals), vegetable crops, long-day onions, watermelons, melons, and pasture crops (grasses).

The deciduous fruit and grapes are not planted by the Directorate, but use is made of the trees in the collection orchards of the Agricultural Research Council as well as trees on the farms of applicants. The reason for this is that it saves a lot of time and money and the evaluations can also commence at an earlier stage if mature trees are used than when the Directorate has to start from scratch with trees which have just been grafted.

The personnel at Stellenbosch consists of 5 professional officers and Agricultural technicians as well as 1 laborer. When additional laborers are needed they are drawn from the labor pool of the farm.

Approximately 6 hectares of land is used for the annual crops.

3. <u>Nelspruit</u>:

The most important crops that are planted here are citrus and subtropical fruit. The two officers of the Directorate are "guests" at the Institute for Tropical and Sub-Tropical Crops and have their offices at the institute.

Just like Stellenbosch, use is made of the trees in the orchards of the Institute as well as trees on the farms of applicants.

Besides the evaluations for the granting of plant breeder's rights and variety listing, seed samples are also planted at both Stellenbosch and Roodeplaat and evaluated for varietal purity. These samples originate from:

(a) sellers of seed - inspectors from the Directorate draw these samples;

(b) post control samples of seed lots which are certified by SANSOR. The samples are supplied by SANSOR; and

(c) seedlots which are imported into South Africa and of which inspectors draw samples at the ports of entry.

DISCUSSIONS

1. <u>Mr. S. Fakir</u> (South Africa) referred to page 6, point 4(c) ("essentially derived varieties") and wanted to know if new varieties resulting from new technology could be protected. He went on further to ask if a variety was protected with a given denomination in one country, how could one determine if that variety was the subject of a new application if the name was changed.

<u>Mr. Joubert</u> (South Africa) answered that all the UPOV member States regularly sent out a plant variety journal where the names of candidate varieties were published so that they could be checked by the different countries. Should a variety be submitted in South Africa and the name changed, there was a potential problem because one could end up with one variety with different denominations. If this were to happen the application could be canceled. Applicants are required to give information concerning foreign applications.

Referring to <u>Mr. Fakir's</u> next question, <u>Mr. Joubert</u> said that as long as it passed the DUS test, a variety would be recognized irrespective of the technology used by the breeder. If it were an essentially derived variety then it could not be marketed without the license and consent of the owner of the variety from which it had been derived. He specifically added that no one could get plant breeders' rights for something taken from nature. There must have been at least some breeding involved.

2. <u>Mr. Fakir</u> commented that within other international organizations, e.g. GATT, there was an international trend towards patenting life forms. He saw tension between plant breeders' rights and the patent system. He asked what influence this new emerging form of intellectual property had on UPOV and what collaboration existed.

<u>Mr. Greengrass</u> answered that after the UPOV Convention was amended in 1991, any tension disappeared because plant breeders had an updated form of protection suitable for their needs. He emphasized that the UPOV system was user-friendly and very accessible. In the patent system one could get protection at an early stage for say, a patented gene. Nothing could be done with a gene on its own. It had to be put into a variety and then protection could be sought later on the transformed variety. The transformed variety would probably be essentially derived and could therefore not be exploited without a license from the breeder of the variety that was transformed. The two systems of protection were very complementary.

3. <u>Dr. J.P. Jordaan</u> (South Africa) asked whether it were possible to take out patent rights on varieties in countries which were not members of UPOV.

<u>Mr. Greengrass</u> replied that for countries which were not member States of UPOV it was a matter for the patent laws whether they did or did not grant patents for plant varieties. Most plant varieties did not satisfy the criteria of the patent system. Article 2 of the 1978 Act, forbade the granting of patents for a species for which breeders rights were available. The 1991 Act, on the other hand, made no corresponding provision. Under the 1991 Act, countries were required to offer protection for all plant genera and species in accordance with that Act but could grant patents for plant varieties in addition, if they so wished. It was a matter for national law: America and Australia were the only countries which had granted

patents for plant varieties in the recent past and even they had granted few such patents. The plant breeder' rights system was an excellent working system and did not need to be sheltered from the effects of the patent system.

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THIRD SESSION: SELECTED TOPICS ON PLANT VARIETY PROTECTION

Chairman: Mr. David P. Keetch, Director, Directorate Plant and Quality Control, National Department of Agriculture, Pretoria, South Africa

THE EUROPEAN APPROACH TO PLANT VARIETY PROTECTION

Plant Variety Protection in Sweden

Speaker: Mr. Karl Olov Öster, President, National Plant Variety Board, Stockholm, Sweden

Plant Variety Protection in the United Kingdom

Speaker: Mr. David Boredom, Controller, Plant Variety Rights Office, Cambridge, United Kingdom

Plant Variety Protection in Zimbabwe

Speaker: Mrs. Cesium Mtindi, Head, Seed Service, Department of Research and Specialist Services, Harare, Zimbabwe

Intellectual Property Rights and the Seed Industry

Speaker: Mr. J. van der Walt, General Manager, South Africa National Seed Organization

Plant Variety Protection and Vegetatively Propagated Crops in South Africa

Speaker: Mr. J.G. Niederwieser, Agricultural Research Council, Vegetable and Ornamental Plant Institute, Pretoria, South Africa

PLANT VARIETY PROTECTION IN SWEDEN

by Mr. Karl Olov Öster, Permanent Secretary, Ministry of Agriculture, President, National Plant Variety Board, Stockholm, Sweden

1. First of all I would like to say how pleased I am to take part in this UPOV Seminar and, of course, to visit South Africa. Sweden has always taken a great interest in the development of South Africa and I, personally, wish your country all the best for the future. I think that several of the countries taking part in this Seminar have been cooperating with Sweden and other Nordic countries within the framework of support to the Southern African Development Community (SADC) in plant breeding and seed programs and gene bank activities.

2. In this connection, and more specifically, I would like to mention that, since 1989, the Nordic Gene Bank has actively collaborated with SADC in a 20 year program supported by all the five Nordic countries. The aim is to establish a regional gene bank. In the autumn of 1994, South Africa joined this important effort. A central, regional center for storage of base collections from all the eleven SADC-countries is now established at Chalimbana, near Lusaka in Zambia. Centers for active collections of national plant genetic resources are, or will be, available in each of the eleven countries. This effort is in line with the Rio Convention on Biodiversity. These collections will be of vital importance for the future of plant breeding in this region.

3. In this context, I will not only be talking about plant breeders' rights legislation in Sweden. To begin with I will say some words about agricultural and horticultural plant production and plant breeding in Sweden. This will perhaps give you a better view on the background to our work with plant breeders' rights in Sweden.

4. Now, what is Sweden like from the agricultural point of view? Sweden is located between latitude 55 degrees, 20 minutes south and 69 degrees, 4 minutes north. The total length of the country is almost 1,600 km. The total area is about one-third of that of South Africa. The differences in climate between northern and southern Sweden mean that the conditions for agriculture varies very much between the northern and the southern parts of Sweden. The vegetative period varies between 120 days in the north and 155 days in the south. To some extent, the short summer in the north is compensated by longer days and by continuous daylight for about two months. Anyhow, agriculture in the north is limited by its conditions and it requires early maturing and/or winter-resistant crops. Crop production in the south is more diverse and the yields there compete fairly well with those in neighboring countries further south in Europe.

5. The population of Sweden is about 8.5 million. At present Sweden has in total about 91 000 farms. Less than two per cent of the population works in agriculture. The total of agricultural land covers about 2.8 million hectares, which is used as follows:

Crops	Percent (%)
Cereals for Bread	12
Grain for Fodder	30
Forage, mainly leys	38

Potatoes and sugar beets	3
Oil rape and oil turnip rape	5
Pulses	2
Fallow	10
Total	100

6. The cereals used for bread-making are wheat and rye, in both of which the winter form dominates. The grain species for animal feed are barley (mainly of the two-rowed spring form), oats, some triticale and maize. The main components of the leys are timothy and red clover. Meadow fescue, perennial ryegrass and some other grasses and legumes are also quite common in the southern part of Sweden.

7. The nature of professional horticulture in Sweden is illustrated by the following statistics:

Crops	Hectare
Plants in green house and bench	330
Vegetables	5 750
Fruit Trees	2 420
Berry bushes	1 010
Strawberries	2 650
Nursery products	830
Other horticultural plants	710

8. At present the leading ornamentals are roses, chrysanthemum, alstroemeria, tulips, hyacinths, begonia, pelargonium, poinsettia and saintpaulia.

9. The most common vegetables are garden peas, carrots, beans, cabbage, lettuce and garden beets. Apple is by far the most common fruit tree, while pear, plum and cherry are the minor fruit tree species. Black currant is dominant among the berry bushes, as far north as the polar circle.

10. The plant breeding in the agricultural crops is dominated by two major companies, Svalöf Weibull AB and Hilleshög AB.

Svalöf Weibull AB breeds most agricultural and vegetable crops which are of importance for the country. Svalöf Weibull is owned by the Swedish Farmers' Association, which also markets the seed. It also has ownership of subsidiary companies in Central Europe and North America.

Hilleshög AB, which is owned by the multinational company Sandoz Ltd., breeds sugar beet. The cultivation of sugar beet is carried out in Sweden on a contract basis.

The breeding of fruit trees and soft fruits is carried out by the Department of Horticultural Plant Breeding at the University of Agricultural Sciences.

11. Now, why has Sweden introduced the plant breeders rights system and was it by the time of introduction a matter of course for Sweden to join the UPOV system? The answer to this question is, in a way, ambiguous. Sweden took part as an observer in the two plenary

meetings in Paris in 1957 and 1961 on the international protection of new varieties which led to the 1961 Act of the UPOV Convention. Subsequently, the Swedish Government set up a special Commission with representatives from the administration, agriculture, plant breeding and experts on intellectual property law. The Commission produced a unanimous report after four years work. In 1971 the Government submitted a Bill to the Parliament proposing a new legislation on Plant Breeders Rights. The Government expressed its view as follows:

"Swedish legislation on exclusive rights to plant variety obtentions according to the UPOV Convention and an adherence of Sweden to the Convention will in most respects be favorable. Such a law might be assumed to stimulate the breeding firms to efforts in order to produce new and better varieties, which can generate license fees from both the Swedish market and markets abroad. This fact should also lead to increased competition on the Swedish market to the common good. Competition and cooperation in the international field should as a matter of fact be better for research and development than the present work mainly done for the Swedish market, which will become the consequence, if Sweden refrains from joining the UPOV Convention."

12. As you all well know, much has happened in the agricultural field as well as in the plant breeding field in the last 25 years. Nevertheless, the statement in the Bill of the Swedish Government, which was unanimously adopted by the Parliament, is still valid in principle, although the structure of plant breeding has undergone several important changes during the 25 years that has passed since then. In December 1971, Sweden acceded to the UPOV Convention and became the sixth country to accede and become a member of UPOV. Of the five Nordic countries, Denmark had already become a member of UPOV in 1968. Finland and Norway became members of UPOV in 1993.

13. The Swedish Plant Breeders Rights Law contains all the mandatory rules of the UPOV Convention, which of course is a prerequisite for membership of UPOV, but it does not follow in detail the UPOV model law for PBR legislation. What then is the main substance of the Swedish law? The object of protection is a variety that belongs to those species or taxa that are enumerated in the law. At present about 100 species or taxa are contained in the list of protected taxa. The meaning of the word "variety" in the law refers to any cultivar, clone, line, lineage or hybrid, which is cultivable. The word "variety" itself has no further definition within the law, but it has to be defined within the general prerequisites for protection according to the law based on the wording of the UPOV Convention.

14. What kind of protection does the law extend to the breeder? It gives him, or his successor in title, the exclusive right to market the variety according to the provisions of the law. Marketing means here professional marketing. A transfer of seed of a protected taxa to a single neighbor does not constitute an infringement of the granted protection. In principle only varieties bred in Sweden or bred abroad by a Swedish citizen or by a person living in Sweden are granted protection. However the right to apply for protection is extended to a variety bred in another UPOV member State or by a citizen of a UPOV member State or a person living in a UPOV member State.

15. Where PBR is applied for, the plant variety must be distinct, uniform and stable in its characters. I will not go into details concerning the DUS provisions, but, of course, our national practice is adapted to that of the UPOV Convention and the UPOV Test Guidelines.

PBR is granted if material of the variety has not been marketed before the date of application in Sweden or abroad for more than six years before the date of application in the case of vines, fruit trees, forest trees or ornamental trees or for more than four years before the date of application in the case of other varieties than those.

16. To what extent does the PBR system in Sweden grant protection to the breeder or the holder of a grant? The scope of protection refers to propagating, importation for propagating purposes, marketing of material of the variety or using protected material for the purpose of repropagation. The scope of protection goes still further when it comes to cut flowers, where the use of single plants for production of new plants is forbidden. Protection does not extend to the use of material of a variety that has been marketed within the European Economic Area by the holder of the grant or by his consent.

17. How does a comparatively small country manage a PBR system? When PBR was introduced in Sweden the Government set up a special board, the National Plant Variety Board, and assigned to it the task of administering the PBR system. The Board has nine members, namely a chairman, a vice chairman and seven other members. These members represent Government, Law, Research, Seed Testing, Local Government in Agriculture and Horticulture and finally Farming. One should therefore bear in mind that there is no representative of breeders or seed traders within the Board. The Board's task is to make impartial decisions on applications.

18. How does the National Plant Variety Board work in practice? The administrative work is managed by the Head of the Office, who is an agronomist. He presents the applications or other business to the Working Committee of the Board, which in principle meets every tenth day, except during vacation time. The Working Committee contains the Chairman and the Vice Chairman. Current business is taken up and discussed by the Committee, which prepares all the final decisions that will be taken by the Board in plenary. The Board itself will meet in plenary only three or four times a year. Besides granting PBR, the Board has responsibility for the inclusion of varieties into the National List of Cultivars, which contains varieties that are eligible for seed certification.

19. According to the UPOV Convention and the Swedish PBR Law, the DUS criteria have to be assessed in specific DUS tests to ensure that a variety meets the UPOV Test Guidelines. In Sweden, we ourselves test only grain and potatoes. The domestic tests are done by the National Institute for Tests and Certification of Seeds. We have various agreements with Denmark, Germany, Netherlands, the United Kingdom and Belgium on cooperation in testing, according to the UPOV System. If a variety is already tested before the application for PBR is delivered, the National Plant Variety Board buys, at the cost of the applicant, test results from the country where testing has taken place.

20. If there is no impediment at the time of examining the application, a formal announcement is published in the Gazette of the Plant Variety Board, which gives the public an opportunity to raise objections against the application. An objection might refer to the novelty of the variety, to the identity of the applicant as such, to the chosen variety denomination or any other matter that may raise doubts concerning the application. The applicant is always entitled to make comments on any objection before the final decision is taken by the Board.

21. When everything concerning documentation and examination is completed and in order, the application is taken up by the Board for a final decision, after preparatory treatment by the Working Committee of the Board. As a matter of fact, very few applications are rejected by the Board at this stage, because during processing of the application by the Working Committee problems or obstacles, which might have led to the withdrawal of the application, are normally sorted out.

22. A grant for PBR is valid for 20 years following the year of consent to the application. A rejection of an application by the National Plant Variety Board can be appealed to the National Board of Agriculture. A decision by that Board can be appealed against with the Supreme Administrative Court, whose judgment is final.

23. About 400 varieties are protected by PBR in Sweden today. Our National List of Cultivars contains about 450 varieties. The increase in protected varieties is mainly in the field of ornamentals.

24. There are currently three main topics in the field of plant breeders' rights, namely discussions on biotechnology, on the EC plant variety rights system and on the question of Sweden's accession to the 1991 Act of the UPOV Convention. All three topics are increased in importance by the fact that Sweden, on 1 January, 1995, became a member of the European Union (EU). Three of the five Nordic countries have now joined the EU, these being Sweden, Denmark and Finland. Iceland and Norway are not members.

25. I will not go into details on these various subjects. I just want to state that PBR according to the UPOV system has proved to be a useful tool when it comes to intellectual property and the protection of new plant varieties. The main doubts that were raised before the introduction of the system have not had much support today in the general debate.

26. During the UPOV Diplomatic Conference in 1991, Sweden was against lifting the socalled ban on double protection of plant varieties, which meant that one could not protect a variety both by patents and by PBR. However, I do not think that this aspect of the 1991 Convention will hinder Sweden's ratification. There are, however, a couple of questions that have to be answered before the Government takes its decision to present a bill to the Parliament. You have to decide whether the 1991 Convention represents a fair balance between the interests of the breeders, farmers, trade and consumers. This applies in particular to the scope of protection, the question of essentially derived varieties and the farmer's privilege, especially seen in the light of the newly introduced community plant variety right, which is valid for member states of the European Union.

27. I thank you all for your attention and I will be ready to answer any questions which you would like to ask.

DISCUSSIONS

1. <u>Dr. J. Mushanga</u> (Zimbabwe) asked about Mr. Öster's reference to Sweden where 400 varieties were protected by plant breeders' rights, and asked how long the protection lasted.

<u>Mr. K. Öster</u> (Sweden) replied that most of the varieties protected were ornamentals and most were not of Swedish origin, 66% being foreign. A grant of plant breeders' rights in Sweden was valid for 20 years following the year of consent to the application.

2. <u>Dr. R. Ellis</u> (South Africa) asked how material was dealt with that was developed and bred in a non-UPOV country, if someone wanted to go into breeding.

<u>Mr. Öster</u> replied that the material was not protected and, in principle, if protection was required according to the present legislation, there must be a connection to a UPOV country.

PLANT VARIETY PROTECTION IN THE UNITED KINGDOM

by Mr. David Boreham, Controller, Plant Variety Rights Office, Cambridge, United Kingdom

1. It gives me great pleasure to be here in South Africa. I have been asked to tell you about plant breeders' rights in the United Kingdom, and how we operate our system. However, it might be helpful if I give you a little background to begin with, and explain what led to our entry into UPOV and the introduction of our plant breeders' rights system.

2. First, just a broad picture of agricultural land use in the United Kingdom. Crop production currently uses approximately 28% of United Kingdom agricultural land; grassland a further 40%, and rough grazing 27%. Of the land down to crops, about 41% is wheat, 26% barley, 9% oilseed rape, and the remainder primarily sugar beet, peas and beans and horticultural and other crops. There is, however, a trend, albeit gradual, towards more specialist crops such as linseed for industrial use, hemp for fiber production etc., as part of the government's policy of encouraging diversification and reducing surpluses of the main cereal crops.

3. With regard to seed production, farmers in the United Kingdom spend about 290 million pounds per year on purchased seed, primarily of cereals (435,000 tons), potatoes (283,000 tons), and much less on other crops, although oilseed rape is of increasing importance.

4. Today, all the major plant breeding effort in the United Kingdom is in the hands of the private sector, although there is some state work on potatoes and grass varieties. This was not the position in the immediate post-war period, where the major varieties of cereals were either state-bred or imported. In 1959, just prior to the signing of the first UPOV Convention, 93% of the England and Wales wheat acreage was sown with foreign-bred varieties (foreign then meant non-UK, not non-EC!) and 81% of the barley and 86% of the oats acreage was sown with state-bred varieties. Private breeders in the United Kingdom provided a very small proportion of the total market.

5. It was against this background that the Government of the United Kingdom, like others in Europe at the same time, were keen to encourage the growth of the plant breeding industry, particularly in the private sector, and to increase the returns from the breeding programs in the state sector. This was, of course, 20 years before the word "privatization" formed such an important part of United Kingdom policy, and which lead to the selling-off of most state sector plant breeding. The United Kingdom thus became one of the original signatories to the 1961 Act of the UPOV Convention, and introduced its domestic legislation with the Plant Varieties and Seeds Act of 1964.

6. The introduction of plant breeders' rights has clearly been a major contributor towards the improvements in yield and quality that have taken place. United Kingdom yields of wheat have almost trebled since the war, from 2.4 tons/ha in 1947 to 6.8 tons/ha in 1992. Barley yields have increased from 2.3 tons/ha to 5.7 tons/ha during the same period. During the past

twenty years, i.e. since the first effects of plant breeders' rights began to come through, it is estimated that about half of the increase in yields of these cereals has been due to improved varieties; the other half is attributable to improved husbandry techniques. At the same time, improvements in quality and disease resistance has also been marked, and it seems likely that these attributes will prove more important in the future, with the environmental pressures and the need to supply more exacting demands from the market.

7. Having set the scene, how do we operate our plant breeders' rights system in the United Kingdom? First, as you will be aware, the system is entirely voluntary.

8. There is no obligation to obtain rights, but we do operate our plant breeders' rights system along side a statutory European Community system that requires all varieties of agricultural and vegetable crops to be officially listed, and the DUS test, the main technical criterion for obtaining plant breeders rights, is also required for the system of National Listing. However, the majority of breeders do seek rights, as it is the only way they can clearly protect their interests, as well as it being the major source of revenue from royalty income. So in the United Kingdom we currently offer protection for about 474 species, and protect some 2152 varieties. I can also give you some idea of the number of varieties we have protected during the past ten years. We always try to react positively to requests to extend protection to new species, and of course under the 1991 Act of the UPOV Convention we shall eventually have to offer protection to all plant genera and species. As an example of the current throughput of the Office, in 1994 we received 569 applications and issued 367 grants of rights.

9. Costs are of course an important factor, the more so in the United Kingdom since we moved to a system of full cost recovery for all our plant breeders' rights work in 1989. Although this meant an initial steep rise in fees, which is as might have been expected, we have made enormous strides in reducing costs, partly through streamlining procedures and increasing computerization, and having reduced our fees last year, we have been able to hold them at the same level this year. How a UPOV member State sets its fee structure, and whether it seeks to recover the full cost, is, of course, a domestic matter. Clearly, even within the European Community, there are wide variations in practice, and this has been one of the problems we have faced in introducing a Community-wide plant breeders' rights system. However, to give you some idea of our current fee structure, and taking cereals as an example, we have the following:

Fee Structure	Pounds (£)
Application fee (covers actual cost of processing application)	245
DUS Test fee per year (covers technical examination costs)	665
Annual renewal fee (covers costs of maintaining reference collections and other systems)	390
Grant of plant breeder's right (covers cost of issuing grant and setting up records)	130

10. So for a cereal variety requiring the normal two year testing period, it may be said that the approximate cost of obtaining a plant breeder's right is 1705 pounds, plus 390 pounds per year thereafter. Given the large profits that a successful cereal variety can bring in, this does not seem unreasonable. Fees for other crops are generally less than this.

11. The United Kingdom Plant Variety Rights Office has a staff of eighteen, but most of these are also engaged in operating the National Listing system, to which I referred earlier, so the actual number involved in plant breeders rights' work would be the equivalent of about ten staff. This does not include the technical DUS work, which is undertaken on behalf of the Office by technical contractors, primarily the National Institute of Agricultural Botany in Cambridge, the Scottish Agricultural Scientific Agency and the Department of Agriculture for Northern Ireland. We also use a number of specialist collections, such as the Brogdale Horticultural Trust in Kent, who do our fruit testing, and the Royal National Rose Society in St Albans.

12. The cost of DUS testing is high, but one way of mitigating this is to utilize the UPOV system of bilateral testing agreements, under which one member state undertakes to test varieties for another, or can purchase a test report already under way or completed, for a fixed sum of 350 Swiss Francs. Within Europe we make extensive use of this arrangement, and have recently been extending agreements where possible in order to reduce duplication of DUS testing. However, we also have agreements with Australia and New Zealand, and as we are required under the new Convention to offer protection in all plant species, I can foresee the need to extend our range of bilateral agreements still further.

13. So that, very briefly, is how we run our system, and I shall be happy to expand on any points in which you may be interested. Now, I should like to turn to the future. First, as agriculture in Europe becomes more specialized, and, as I have said, there are greater demands for crops with particular characteristics or bred for specific markets, so the science and technology--particularly biotechnology--needed to meet these demands will need to be increasingly sophisticated. This means greater financial inputs, and the breeders will simply not be prepared to invest in this research unless they can be assured of a good level of remuneration. Even in those countries where there is still a strong state plant breeding industry, it is likely that the state will wish to recover an increasing proportion of its costs, and to encourage inward investment. The term "multi-national company" is not always well received, but the fact is that the level of investment needed, particularly in modern biotechnology, makes it inevitable that the larger companies will predominate in this work.

14. So, I believe that there will be an increasing need for plant breeders' rights--and do not forget that they reward the small, individual breeder just as much as the large company. The 1991 Act of the UPOV Convention has provided us with the legal framework in which to amend our national legislation. The essential advantage of the revised Convention is the increase in the scope of the breeder's right to cover not only the sale of a variety or acts associated with the sale, but the production and conditioning of seed saved for further sowing on the farm, and all the normal acts associated with the use of seed. The potential extension of the right to harvested material and products made from harvested material will also be useful in specific cases, such as cut blooms of flowers imported from non-UPOV countries. Then there is the new category of essentially derived variety, which will enable breeders to

guard against piracy or plagiarism of their varieties, whilst rewarding the breeder of the genuinely improved variety through genetic modification.

15. The United Kingdom intends to ratify the revised Convention as soon as Parliamentary time is available to do so. We have already consulted our industry on the proposed changes, which affect farmers and seed processors as well as breeders. Most of the proposals have been welcomed. However, by far the most controversial change is the extension of the breeder's right over farm saved seed, and the extent to which a Contracting Party to the new Convention should take advantage of the "optional exception" from the breeder's right to allow its continued use. You will recall that any such exception must be "within reasonable limits" and safeguard the legitimate interests of the breeder.

16. Finding a balanced solution to this question has proved difficult within the United Kingdom, let alone on a European Community basis, where it has been addressed in the context of the new Community-wide plant breeders' rights system. Agreement has been reached on the broad basis on which this will work and I believe that we have done our best to be fair to all the parties. Small farmers are exempted from paying royalties, as are farmers who continue to save established varieties, for a further seven years. Royalties on farm-saved seed must be "sensibly lower" than those on purchased seed, which under European Community rules must be officially certified. The interpretation of "sensibly lower" will be left to the breeders, or perhaps the courts in the case of a dispute.

17. I am not sure to what extent the use of farm-saved seed constitutes a problem for the plant breeding industry in southern Africa--I recall that the matter was discussed at the UPOV seminar in 1993, where it was felt that it depended to some extent on the use of self-pollinated crops. I imagine, as in Europe, that it also depends upon the relative price of certified or purchased seed and the availability of seed processing equipment. I should be interested to hear your views on this.

18. I referred to the new European community plant breeders' rights system, which actually came into effect a week ago on April 27. This system will, we hope, exist under the UPOV Convention, and we expect the Community to be the first inter-governmental organization to join UPOV. This is a significant step, not only because of the inherent advantages to the breeder from a right in 15 countries obtained from a single application to a Community Office, but because I believe it may signal a way forward for other groups of countries--who knows? Even in southern Africa--for whom the setting up of individual national systems may at present be too costly or technically demanding. This will be the main advantage in Europe-the pooling of resources based upon the valuable work of UPOV in producing technical guidelines and organizing international co-operation.

19. Finally, whilst we recognize the excellent job that UPOV is doing in explaining its work and the importance of plant breeders' rights, the United Kingdom is equally very willing, particularly given its strong links with southern Africa, to assist any country or group of countries by providing further information or possibly training in both the technical and administrative aspects of plant breeders' rights. The National Institute of Agricultural Botany in Cambridge has been running a number of successful training courses in recent years, particularly for the Eastern Bloc countries, and is ideally placed to assist others if the demand exists. Similarly, my Office is always ready to provide information or assistance.

PLANT VARIETY PROTECTION IN ZIMBABWE

by

Mrs. Kusum Mtindi, Head, Seed Services, Department of Research and Specialist Services, Harare, Zimbabwe

1. Food self-sufficiency is the major goal of the Government of Zimbabwe, followed by agro-exports which are of great importance as it earns the country foreign currency that is much needed to keep the economy buoyant. Agriculture, which includes horticulture and meat production, is the mainstay of the economy. Zimbabwe is a leading exporter of tobacco, cotton, fresh fruit, vegetables, tea, coffee and cut flowers. During the 1994/95 season, Zimbabwe exported 6101 tons of cut flowers, valued at Z\$230 million^{*}, 2736 tons of vegetables, valued at Z\$67.3 million, and 15000 tons of citrus fruit valued at Z\$45 million. In rose cut flower production, Zimbabwe is placed third after Kenya and Israel. Tobacco export earnings were to the tune of Z\$3.5 billion during the 1994/95 season.

2. Zimbabwe has a well-established seed trade. It may be stated that it is self-sufficient in seeds of the major crops and supplemented by small imports of vegetable and flower seeds. In addition, the country prides itself regionally for having a lion's share in the seed trade. It also enjoys a fair share of the international seed market. Seed exports include the following crops: maize, sorghum, millet, sunflower, dry beans, soybeans, groundnuts, tobacco, cotton, potatoes, pasture legumes and grasses, flower, vegetables and forestry seeds. Seed export earnings are estimated in the region of Z\$300 million. The industry is organized under the Seed Trade Association with a membership of 25 seed enterprises. Trading in seed is regulated by the Seeds Act of 1965, accompanied by its enabling regulations Seed Regulations (1971) and Seeds Certification Scheme (1971).

3. Plant breeding research was initially conducted by government and statutory boards, but in some more recent years, seed organizations, academic institutions, non-governmental organizations and multi-national organizations have been engaged in this activity. Plant/crop species that may be granted plant breeders' rights are declared under the prescribed kinds of plants. Protected and unprotected varieties are entered into the Official Variety List.

4. The Plant Breeders' Rights Act was made law in 1973, and became effective as of October 1, 1974. The Minister of Agriculture made it quite clear that legislation was in no way restrictive but designed to assist the orderly development of seed and plant production. Patent rights for plant varieties are not provided for in the Patent Act, which provides for patent rights for inventions, techniques and processes.

5. Some salient features of the Plant Breeders' Rights Act are:

(i) It is a voluntary system in that it is the innovator's choice to decide whether or not to apply for the rights. The law places no obligation on the innovator to protect the new variety.

* Z = Zimbabwean dollars

(ii) The plant breeders' rights protection does not extend to all kinds of plants. Nevertheless, the prescribed list could be amended if a person applies to the Minister for plant breeders' rights to be granted for a particular plant.

(iii) It allows for reciprocal rights with other countries, so that an application for the granting of plant breeders' rights in Zimbabwe automatically gains protection in those countries.

6. The Plant Breeders' Rights Office is placed under the Ministry of Agriculture and operates from Seed Services which is the seat of the seed testing and seed certification. The office is manned by the Registrar of Plant Breeders' Rights, who is also the head of the Certifying Authority assisted by either a clerk/secretary. The tasks performed at the office are as follows:

- The application is received by the clerk/secretary who checks whether the application is completed correctly, the plant breeders' rights fees is received and recited and the applications are date stamped.

- The Registrar checks the validity of the application and that the declarations are accurate and honest and enters the application into the Plant Breeders' Rights Register.

- The Registrar subjects the material to a DUS test

- Successful applications are prepared for publication. The gazetting is done through Government Publishers

- If special advice is needed, the Registrar can confer with the Ministry of Justice and Legal Affairs. Technical assistance in DUS testing is achieved through close cooperation with researchers and collaborators.

- Royalties are processed at the Reserve Bank of Zimbabwe which are essentially royalties paid to other countries.

7. In recent years, the increasing numbers of applications for varietal protection is being handled by the Plant Breeders' Rights Office. Increasingly so in fruits and ornamentals. The breakdown of the 454 varieties of crops species listed in the Plant Breeders' Rights Register are: soybean 15, cotton 16, groundnuts 6, wheat 11, sorghum 3, maize 53, tobacco 7, barley 1, rape 3, sunflower 1, pearl millet 1, rice 4, potato 3, dry beans 16, cowpeas 1, cabbage 1, peas 6, roses 270, asters 18, protea 1, apricot 1, peach 2, nectarine 7, plum 2 and apple 3. The number of applications handled annually during the last 5 years are presented in the table on the below:

Year	Applications
1990	63
1991	43
1992	34
1993	67
1994	78

8. It is widely acknowledged that the seed program in Zimbabwe is a mature system that fits into four stages of the seed activities described by Douglas (1980). Let us go through the four developmental stages briefly and analyze if Government's aspirations have achieved national food self-sufficiency by providing farmers with quality planting seeds of superior genotypes.

(i) <u>Stage One: Traditional Agriculture</u>

8. During the period between 1890 and 1900, there was no formal agriculture. Maize, tobacco and cotton were traditional standard crops cultivated at the beginning of the century. Farmers obtained samples of seed, bulked and maintained the seed on their farms. Maize was already an established crop at the time of European occupation. It was intercropped with sorghum, millet, beans and groundnuts. Diffusion of planting seed amongst farmers was through farmer to farmers exchange of seed.

(ii) <u>Stage Two: Emergence</u>

9. 1900-1950. The Department of Agriculture was established at the beginning of the century. Farmers ordered the importation of pedigree seed of maize from the United States of America through the newly formed department. The Maize Breeders Association was formed in 1919 with the blessing of the Department of Agriculture, with the sole objective of improving maize by better methods of seed selection and better production of pure bred seed. About 17 suitable varieties of tobacco seed were imported and distributed amongst farmers for experimental purposes and established cooperation with the United States Department of Agriculture. Soil samples and leaf samples were sent for analysis and advice. Varieties of cultivated cotton were imported from Europe, Brazil and the United States of America. In 1918, tobacco and cotton experts were appointed to the department. Government began to gradually initiate plant breeding research starting with priority crops such as cotton and tobacco. Formal maize breeding commenced in 1932 and seed multiplication of improved varieties started in 1940 by the Zimbabwe Seed Maize Association.

10. Plant breeding research was also initiated by the Government in other crops, such as oilseeds, winter cereals, pasture legumes, potatoes and small grains. As varieties were churned out of these programs, it was essential for seed organizations to be formed to bulk and market seed.

(iii) Stage Three: Growth

11. Private seed companies emerged between 1950 and 1980, and specialized in research, production and marketing of seed.

- 1939: Zimbabwe Seed Potato Association was formed when it was feared that seed supplies would be interrupted by war.
- 1957: Zimbabwe Crop Seeds Association, which handles the seed production of oilseeds, winter cereals, and small grains, was formed.

- 1957: Zimbabwe Tobacco Seed Association was formed to handle tobacco seed production and marketing.
- 1964: Zimbabwe Pasture Seed Growers Association services the seed requirements of pasture seeds and legumes.
- 1970: Cotton Seed Multiplication Scheme of the Cotton company handles the production, processing and marketing of seed.
- 1973: Rattray Arnold Research Station was established by the Seed Maize Association through a memorandum of understanding with the government that the maize breeding initiated would complement the national breeding program.
- (iv) Stage Four: Maturity
- 12. 1980 to date:
- 1981: Pannar Seeds, a South African company was established in Zimbabwe to market maize hybrids from their breeding program.
- 1982: Zimbabwe Seed Maize Association and Crops Seed Association amalgamated their business activities and established Seed Coop.
- 1985: Pioneer Hybrid International established two subsidiary companies, a plant breeding program under Pioneer Hybrid (Zimbabwe) and Pioneer Seed Company, to produce and market their hybrids domestically and in the region.
- 1988: Cargill entered the industry initially marketing Ciba-Geigy products and gradually introduced their own hybrids from their international programs.
- 1988: Agricultural Seeds and Services serve the domestic/regional market in open pollinated varieties of beans, cowpeas, sorghum, millets and grasses.
- 1989: Certseed International was formed to market seed exports for Seed Coop.
- 1990: Seed Coop entered into research and marketing agreements with Sensako (S.A.), Zamseeds (ZA) and Semok (MOZ).
- 1994: Africa Pacific Seeds, a joint venture between National Tested Seeds and Pacific Seeds (Australia) was launched.
- 1995: A joint venture in rose breeding and rose production was launched.

13. Conclusions that may be reached from the above are:

- Plant breeders' rights were implemented basically as a response to modernize agriculture and the seed sector. The rights were easily implemented as specialized functions and special legal strategies were already in operation such as a mature quality control system

and varietal release procedure and variety listing. In addition, plant breeders were willing to exercise their rights.

- Plant breeding programs initiated and supported by the Government for commercial crops, such as maize, tobacco, cotton, soybean, wheat, barley and potatoes, received strong support from the private sector which led to the development of tobacco, cotton and agro-industries. The research efforts of the public and private sectors led to a constant release of superior varieties which were easily accessible to farmers through well organized seed delivery systems. From independence with the influx of multinational and international companies the farming community have at their disposal a wider range of genotypes of maize to choose from to suit their environment.

- The success of the plant breeding programs is now attributed to the availability of germplasm, as Zimbabwe is not the center of origin for major commodity crops, in addition to the investment in plant breeding research.

- A higher number of genotypes are available on the market than those listed in the Plant Breeders' Rights Register, as research organizations and some seed companies chose not to protect their materials due to the in-built security of hybrid technology. All foreign companies operating in Zimbabwe have a primary business interest in maize to service the domestic and regional requirements.

– Plant breeders' rights has a direct impact on all communities in agriculture as they have a wide choice of varieties varying in performance and adaptation of the major crops as they use seed which comes through the formal quality controlled system.

- Crops of importance to the majority of the people of Zimbabwe, sorghum, millet, sunflowers, cowpeas, banbarra nuts and dry beans, have received low priority from the public and private sectors as they are not yet fully developed commercial crops. Plant breeding programs of the above-mentioned crops initiated during the past 15 years have had an insignificant output of varieties . However, 16 varieties of dry beans of South African origin have been protected in Zimbabwe due to the importance of the crop domestically and regionally. The output of varieties from the national plant breeding program of groundnuts should improve as the private sector has renewed interest to export groundnuts as confectionery. It is generally acknowledged that the public and private sectors have not paid attention to the nutrition and energy value that these crops give to resource poor people. Therefore modern varieties have not yet replaced the traditional varieties.

- Plant breeders' rights have had a positive impact on the establishment and growth of the horticulture industry in a relatively short period as evidenced by the high number of rose varieties protected. Fruit varieties of South African origin have been entered for protection in recent years.

- It would appear that the government has supported monopoly as evidenced by the channeling of varieties from its breeding programs to individual seed enterprises. Further the owner of the variety, who is the Minister of Agriculture, entered into legal agreements with the seed enterprises to formalize business, strengthen relationships, safeguard its varieties

from piracy and task the beneficiaries to carry a reserve of 20% of local sales to tide over natural disasters.

- General discontent is felt by other participants in the seed industry (local and foreign companies) because they, too, wish to be beneficiaries of the government.

- On farms, saving of seed of protected varieties and farmer to farmer exchange of seed is permitted.

14. According to the theory of intellectual property protection, the prospect of a return on investment will stimulate breeders to invest in developing new varieties. Foreign varieties of some species are playing a significant role and Zimbabwe is keen to test and utilize new technologies. Legislation to test products of biotechnology will soon be in place. Although the owner of the majority of varieties of agricultural crop species, the government's priority has not been that of recovery on investment but rather on the most effective, efficient, timely delivery of its products of research to its clients and it is also thought necessary to hold seed reserves at the expense of the beneficiary. There is concern among plant breeders in the public sector that they may become totally unproductive because of an inability to sustain plant breeding programs on their current budgets. However, it is hoped that the current environment of economic structural adjustment reforms will create a workable balance for public and private sector roles in agricultural research and development.

15. Although Zimbabwe has come through in this discussion as a strong proponent of research and intellectual property protection of products of research, it must be made known that the Government is sympathetic to the concept of indigenous technologies and farmers' rights. It should be further stated that the Government of Zimbabwe is comfortable with the UPOV Act of 1978 as it is compatible with the Plant Breeders' Rights Act of 1965. However, the Government of Zimbabwe expresses concern that countries only have until the end of 1995 to join UPOV under the 1978 rules.

INTELLECTUAL PROPERTY RIGHTS AND THE SOUTH AFRICAN SEED INDUSTRY

by

Mr. W.J. van der Walt, General Manager, South African National Seed Organization, Pretoria, South Africa

Introduction

1. The seed is the basic starting point of all production of food, feed and industrial products grown from sexually propagated plants. It is therefore considered essential that research and plant breeding should be an ongoing process in order to improve varieties and to meet the multitude of market requirements. This will only succeed if there are adequate incentives and protection for the plant breeding profession. The value of good quality seed was already recognized early this century by the farming community, namely that bad seed leads to a bad crop (Author Unknown, 1920).

Organized food production commenced with the colonization of South Africa in 1652. This had to go hand in hand with a supply of seed from abroad as South Africa was poorly endowed with indigenous food crops and land races.

Improvement of varieties initially was largely informal, but subsequently universities, government departments and the private sector increasingly became involved. Fruit tree breeding commenced in the 1920's under Prof. Perold at the University of Stellenbosch. The sugar industry commenced development of sugar cane varieties at their own research station in 1925. The first private commercial maize breeder was Mostert who commenced work in the early 1930's leading to the white maize variety Kalahari Early Pearl which became a best seller in the 1940's. This variety is still being sold widely through Africa. During the last two decades Mostert derived very little financial benefit from this variety as he had no plant breeders' rights protection and as the variety was being sold by many parties. The official government maize breeding project became established in 1948 with the assistance of three American experts. Large scale private plant breeding only really got underway during the mid 1960's (van der Walt, 1994).

Present Status of Plant Breeding

2. The success of making available a large number of varieties to the farming community has been based essentially on two major factors. Firstly, access to international varieties, coupled with active germplasm exchange and international cooperation between local and multinational companies. Secondly, local initiative in plant breeding leading to the eventual takeover of breeding of major grain crops by private companies.

The present variety list for agronomic field crops is shown in Table 1, that for pasture and forage crops in Table 2, and the vegetable variety list in Table 3. A summary presented in Table 4 shows a grand total of 759 F_1 hybrids and 806 open-pollinated varieties covering 57 species. This list excludes 59 species which have an open variety list.

A survey conducted in 1993 showed that South Africa annually invests in plant breeding an amount of some US\$ 19 million (SA Rand 70 million). Some 60% of this expenditure is invested by the private industry. Most of the balance is carried by the Agricultural Research Council, and minor amounts by universities. This profession employs some 153 graduates and 189 research technicians (van der Walt, 1994).

A review over 30 years of registration of major grain crop varieties is given in Table 5. The information is also represented graphically in Figure 1. It clearly shows the substantial expansion of registration due to private breeding from the late 60's. It is furthermore evident that very little attention was devoted either by private or public breeders in developing commercial open-pollinated varieties. Today the South African farmer has a choice between 238 maize hybrids and 14 maize open-pollinated varieties.

Likewise, he has at his disposal 39 dry bean varieties, 104 sorghum hybrids and 5 openpollinated varieties, 48 soybean, 72 sunflower hybrids and 6 open-pollinated varieties. The increase in hybrid vegetable varieties is also evident from the fact that 50% of all varieties on the list are F, hybrids.

Protection Under Plant Breeders' Rights

3. The Plant Breeders' Rights Act (Act No 15 of 1976) makes provision for granting breeders' rights which amount to an exclusive period of 5 years, followed by an additional 10 years during which time applications for compulsory licenses may be considered. This legislation protects the breeder from any unauthorized propagation and marketing of plant propagating material. It does permit unlimited use by breeders of protected varieties for the sake of further plant breeding. The deficiency in the present legislation is that it places all responsibility for monitoring and enforcing plant breeders' rights protection on the owner of the variety, whereas no provision is made for facilitating access to premises, seed lots or company records. It therefore makes it very difficult for the owner of a variety to obtain the essential substantiating evidence in order to proceed with litigation. By the same token officials of the Department of Agriculture have no ensured free access to premises, seed lots, or records.

Breeders therefore had to reinforce protection by going to F_1 hybrid wherever possible as is evident of the fact that 50% of all vegetable varieties are hybrids. Furthermore, certification is seen as providing a measure of such additional protection. The Plant Improvement Act (Act 53 of 1976) makes provision for listing of varieties under Table 8 which limits marketing of such varieties to certified seed only. Certification is not intended to provide protection of ownership or market share but only to ensure the maintenance of the genetic qualities of the variety, as well as a guarantee of general higher quality standards.

Protection Under the Patents Act

4. The South African Patent Act of 1915, as amended in 1956, made provision for patenting of propagating plant material. This provision was removed from the Act in 1978, following implementation of the 1976 Plant Breeders' Rights Act. Presently, the patenting of

biological material, and specifically plant varieties, is excluded. Provision is made for the patenting of inventions and processes relating to microbial matter (Geyser & van Niekerk, 1995). Various patents have been granted for specific gene constructs and processes relating to genetic manipulation. However, what was found to be exceptionally alarming was that no official in the patent office could explain the system or present status of patenting such material relating to genetic engineering of plant material.

Impact of Plant Breeders' Rights

5. The results of an in depth study into the impact of plant breeders' rights on Latin American countries was recently reviewed at a seminar presented by the Agency for Inter American Agricultural Development (Jaff & van Wijk, 1995). They could find no clear-cut results of the impact on plant breeding, investment or shift in research funding, perhaps because the countries chosen for the study had largely a limited experience of plant breeders' rights. Furthermore, it is not possible to separate other marketing considerations from that relating purely to plant breeders' rights protection. Likewise, it can be expected that no such impact would be quantifiable for South Africa due to the interaction of protection with decisions based on marketing opportunities and the need to present to the farmer a package of products.

What has been clear is the fact that South Africa has had a relatively open access to varieties available from multinational companies and this would not have been the case had Furthermore, it is to be doubted whether private there been no breeders' protection. companies would have invested in plant breeding efforts on self pollinated crops such as groundnuts, wheat, soybeans and dry beans, apart from various pasture species, had there not been a certain degree of protection and reward for the breeding institution. There has also been a worldwide trend for government departments to take agricultural research away from government service and to establish national research councils for this purpose. All of these councils or institutions face the reality of having to secure part of their funding from outside sources. A common approach is to license varieties to the commercial sector with the purpose of obtaining royalties on the sale of such varieties. It is unlikely that this source of funding can be adequately exploited without the safeguards provided by intellectual property protection. The Agricultural Research Council of South Africa not only applies for plant breeders' rights on all its varieties, but also insists on certification of the seed, where applicable.

"Farmer's Privilege"

6. The opportunity of farmers to retain part of their harvest of especially grain crops with the purpose of using that as seed for the next planting season, is erroneously referred to as "farmers privilege". This conflict between farmers and plant breeders is a worldwide phenomenon which has developed certain political undertones.

The South African seed trade regards itself to be a partner of the farming community and is therefore not at war with farmers. There has definitely never been any actions against small scale farmers who may retain part of their crop for use as seed. There has never been a

court case against commercial farmers in this regard. It is generally felt that this should be approached primarily by way of education in order to highlight the risks involved with retained commodity grain relating to seed-borne diseases, weed seed, risky germination and seed vigor, and general genetic deterioration of the variety. However, if the farmer chooses to retain sufficient seed for reselling to other farmers or on the open market then he exceeds his farming objectives and he becomes a seed trader. The provisions of the Plant Improvement Act ensures that all sellers of seed must be registered with the authorities. In this way such malpractice can be counteracted.

It is felt that any government which makes legal provision in its plant breeders' rights legislation for farmers to retain part of their crop as seed, and/or indulge in marketing of such seed, should also accept the consequent responsibility for ensuring that a mechanism exists for monitoring such retention in order to ensure that the farmers privilege does not stimulate the black market in seed of protected varieties. The author is not aware of any government which has been willing to accept this responsibility. The seed trade generally feels that such privilege only serves to give a blank check to unscrupulous seed traders or brokers to steal protected varieties. This malpractice should be opposed by all parties concerned with plant breeders' rights and all parties who care about the general well-being of food production.

Benefits of Plant Breeding

7. The main contribution of plant breeding and research institutions to the agricultural sector is that it has given South Africa access to international technological progress. In this way the farmer has been enabled to choose from among a large range of varieties of each crop species, these varieties having different characteristics, regional adaptation and product qualities and being sold at various prices. Plant breeding has also enabled the production of food and feed to be at a sustainable economic level. In many crop species production is almost based exclusively on varieties developed in South Africa.

Only a few examples of the value of breeding contribution will be highlighted. Over the past 25 years the long-term average maize yield had doubled, and of this increase some 40% can be directly attributed to improved varieties (Kühn & Gevers, 1961). The impact in 1994 was US\$ 200 million (R 750 million) to the primary producer value. Wheat breeding has contributed over 30 years to raising the average yield by 86%, flour color by 40%, flour yield by 3%, and baking quality by 20% (van Lill & Purchase, 1995). In addition, new varieties are resistant to the Russian wheat aphid, as well as having tolerance to acid soils. Sugar cane varieties have played a very important role with all sugar cane production in South Africa being dependent on local varieties. The variety NCO 310 was also for many years the leading variety world wide, and accounts presently for 50% of sugar cane production on the African continent (Nuss, 1994). Locally bred varieties comprise 40% in the case of peaches, 50% of plums and 24% of apricots, thereby ensuring substantial benefits to the fresh fruit exporting industry (van Zyl, 1994).

South African germplasm as well as varieties are also being used in many other countries. In 1994 applications for plant breeders' rights in the EC amounted to some 8 000 of which 187 came from South Africa (Ghijssen, 1995).

The Future of Breeders' Rights

8. South Africans need to take notice of the fact that there has been an increase in the activity of opportunist seed merchants and brokers. African countries which order seed without specifying quality requirements play into the hands of these parties. Furthermore, there has been a growth in chemicals for on-farm seed treatment and it can be expected that this will be increased with the use of mobile seed cleaners and conditioners, as is the case in many other countries. It is therefore necessary that plant breeders' rights protection be expanded and that enforcement be strengthened.

The new proposed Amendment Bill on plant breeders' rights will ensure that South African legislation meets with the requirements set out in the 1991 Act of the UPOV Convention. This includes also a restriction on breeders' privilege. Legislation provides clearer definitions of protection, infringements and provides for access to premises, seed lots, records and stipulates penalties. No provision is made for the so-called "farmers privilege." The South African seed trade is in support of the draft Amendment Bill.

We sincerely trust that the legislators will handle this Bill on a legal, technical and commercial basis in the interest of all South Africans and not let it become a party political issue. Failing this, we run the risk of the Bill becoming a political compromise to the eventual detriment of food production in South Africa.

With the advent of genetic modification of living organisms it has become essential that all parties be clearly advised as to what can be protected under plant breeders' rights and what under the Patent Act. An investigation into the latter Act is necessary in order to ensure that it will make adequate provision for patenting of gene constructs and genetic engineering processes so that clear cut procedures exist for granting intellectual property rights to this field of science.

In various national and international discussion groups it has become increasingly obvious that research institutions, private breeders, ASSINSEL and UPOV may have neglected the promotional aspect of their profession. There is a dire need for plant breeders to become proactive in public relations and in promoting their industry.

References

Author Unknown, 1920: "Landbouweekblad."

Geyser, H. & A. van Niekerk, 1995: "Personal Communication."

Ghijssen, H., 1995: "International Cooperation in Testing for Registration, IICA Seminar, Bogota, Colombia."

Jaffe, W. & J. van Wijk, 1995: "Impact of Plant Breeders' Rights on Developing Countries", IICA Publication, February 1995."

Kühn, H.C. & H.O. Gevers, 1961: "Hybrid Improvement in the Past Three Decades," Proc. 4th South African Maize Breeders' Symposium, pp. 69 - 73.

Nuss, K., 1994: "Personal Communication."

Van der Walt, W. J., 1994: "Commercial Plant Breeding in South Africa: Development, Problems and Opportunities," Proc XIth South African Maize Breeders' Symposium (in press).

Van Lill, D. & J.L. Purchase, 1995: "Directions in Breeding for Winter Wheat Yield and Quality in South Africa from 1930 to 1990 (in press)."

Van Zyl, H., 1994: "Personal Communication."

TABLE 1

SOUTH AFRICAN VARIETY LIST FOR AGRONOMIC FIELD CROPS AS AT DECEMBER 31, 1994

Specie s	Number of Varieties*	Species	Number of Varietie s *
Arachis hypogaea	13	Phaseolus vulgaris	39
Avena sativa	13	Pisum sativum	19
Glycine max	48	Ricinus communis (F1)) 6
Gossypium hirsutum	11	Ricinus communis (OP	2) 2
Helianthus annuus (F1)	72	Secale cereale	9
Helianthus annuus (OP)	6	Sorghum bicolor (F1)	104
Hordeum vulgare	8	Sorghum bicolor (OP)	5
Lupinus albus	12	Triticum aestivum (F1)	4
Lupinus angustifolius	12	Triticum aestivum (OP)	42
Lupinus luteus	3	Zea mays, white (F1)	110
Nicotiana tabacum	33	Zea mays, white (OP)	11
Oryza sativa	3	Zea mays, yellow (F1)	128
		Zea mays, yellow (OP)	3

Excludes 2 species with open variety list

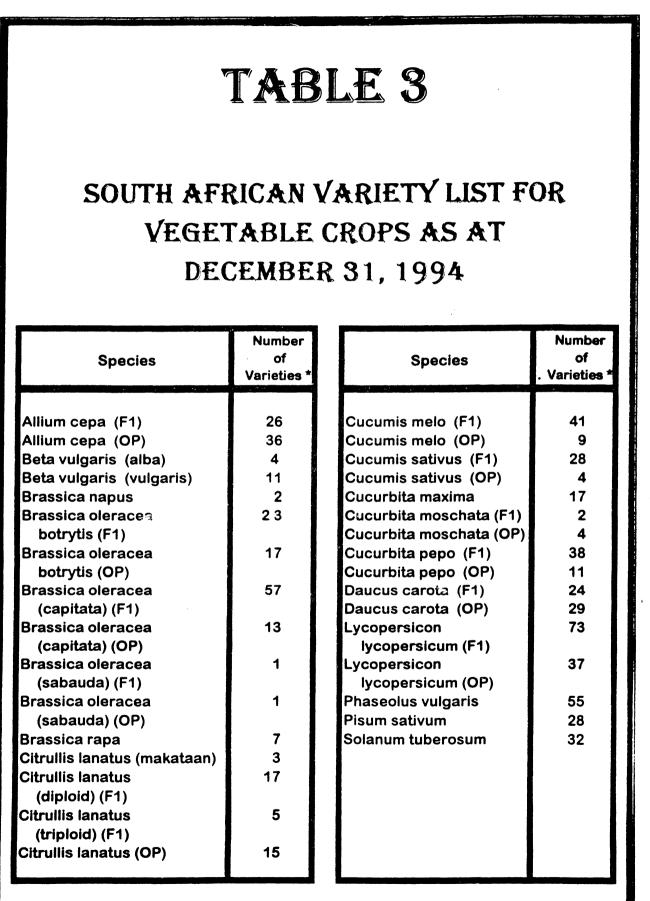
TABLE 2

SOUTH AFRICAN VARIETY LIST FOR PASTURE / FORAGE CROPS AS AT DECEMBER 31, 1994

Species	Number of Varieties *
Agrotrichum	1
Brassica napus	3
Brassica oleracea	4
Bromus wildenovii	3
Cenchrus ciliarus	2
Chloris guyana	2
Dactylis glomerata	8
Digitaria eriantha	1
Eragrostis curvula	20
Festuca arundinacea	17

Species	Number of Varieties *
Hibiscus cannabinus	7
Lolium x boucheanum	5
Lolium multiflorum	29
Lolium perenne	13
Medicago sativa	32
Setaria sphacelata	1
Trifolium fragiferum	1
Trifolium pratense	4
Trifolium repens	8
Triticosecale	17

* Excludes 45 species with open variety list.



* Excludes 12 species with open variety list.

TABLE 4 summary of south african variety lists *			
Agronomic Field Crops 424 F.1 hybrid varieties 293 open-pollinated varieties			
Past	ure / Forage Crops	20 species 178 varieties	
Vege	table Crops	19 species 335 F.1 hybrid varieties 335 open-pollinated varieties	
тот	AL	57 species 759 F.1 hybrid varieties 806 open-pollinated varieties	

* Excludes 59 species with open variety list

TABLE 5

NUMBER OF CULTIVARS ON THE OFFICIAL VARIETY LIST

Year	White Maize	Yellow Maize	Grain Sorghum	Sunflower	Soybean
1964	12 F1*	4 F1	30 F1	- ***	-
	22 O.P.**	15 O.P.	14 O.P.	-	9
1970	12 F1 24 O.P.	4 F1 12 O.P.	30 F1 14 O.P.	-	- 9
1975	57 F1 1 O.P.	31 F1 2 O.P.	54 F1 14 O.P.	•	- 6
1980	109 F1	90 F1	90 F1	28 F1	-
	18 O.P	12 O.P.	6 O.P.	3 O.P.	23
1985	101 F1	155 F1	85 F1	61 F1	-
	19 O.P.	12 O.P.	7 O.P.	3 O.P.	32
1990	135 F1	166 F1	97 F1	98 F1	-
	11 O.P.	2 O.P.	3 O.P.	2 O.P.	41
1993	124 F1	160 F1	115 F1	65 F1	-
	15 O.P.	4 O.P.	5 O.P.	2 O.P.	47
1994	110 F1	128 F1	104 F1	72 F1	-
	11 O.P.	3 O.P.	5 O.P.	6 O.P.	48

(Source : Official Government Variety Lists)

*	=	F1	=	First generation hybrid
**	=	O.P .	=	Open-pollinated variety
***	=	No su	nflowe	er variety list until 1979

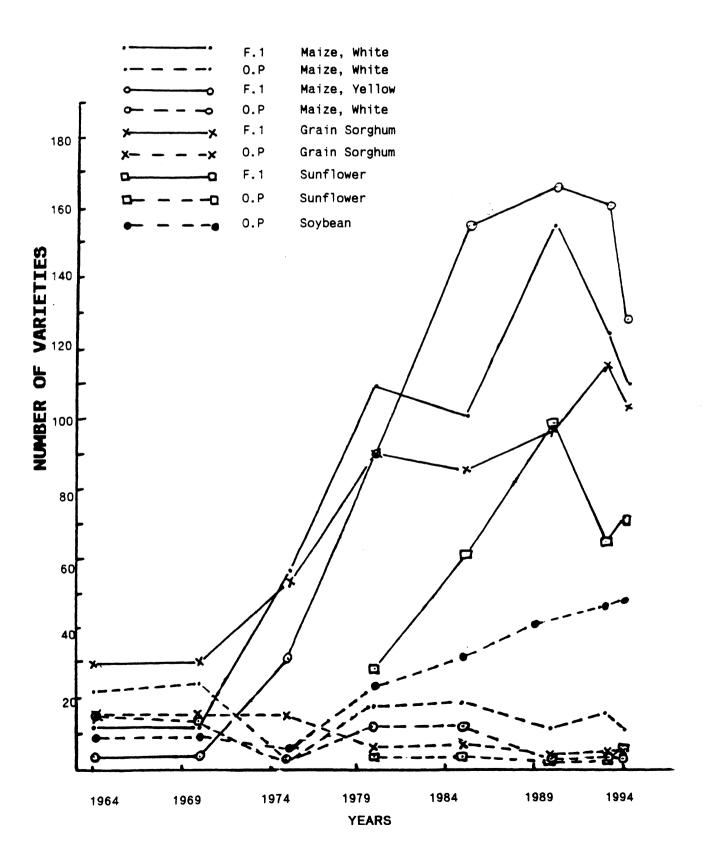
TABLE 6 SUMMARY OF SOUTH AFRICAN PLANT **BREEDERS' RIGHTS AS AT DECEMBER 31, 1994** Non-TOTAL **Crop Group** Residents Item Residents Agronomic/Forage 34 29 63 12 Fruit 19 31 Applications 1994 **Ornamentals** 15 99 114 Vegetables 15 18 33 TOTAL 241 76 165 Registrations Agronomic/Forage 31 2 33 Granted 1994 Fruit 10 5 15 **Ornamentals** 2 2 Vegetables 9 24 33 TOTAL 52 31 83 **Total Valid** Agronomic/Forage 188 74 262 **Breeders' Rights** Fruit 106 34 140 31 December 1994 **Ornamentals** 54 218 272 Vegetables 68 62 130 TOTAL 416 804 388

99

TABLE 7						
SURVEY OF PLANT BREEDING FUNDING AND EMPLOYMENT IN						
SOUTH AFRICA IN 1993Market SegmentR & D Expenditure (US\$ x million)Graduates EmployedTechnicians Employed						
Agronomic (11 institutions)	10,06	85	88			
Vegetable (8 institutions)	2,34	20	23			
Forestry (8 institutions)	2,29	15	24			
Fruit (4 institutions)	1,97	12	19			
Sugar cane (1 institution)	1,14	4	12			
Forage / Pasture (4 institutions)	0,74	8	14			
Flowers (3 institutions)	0,57	9	9			
TOTAL	19,11	153	189			

Figure 1

PROGRESS OF REGISTRATION OF NEW VARIETIES ON SOUTH AFRICAN VARIETY LISTS 1964 - 1994



DISCUSSIONS

1. <u>Dr. J. Luhanga</u> (Malawi) asked how Government breeders benefited from a situation where a plant breeders' rights system was in force.

<u>Mr. D. Cronje</u> (South Africa) replied that in South Africa, up to 1982, most breeders worked for the Department of Agriculture based at the Institute of Agricultural Research which was granted plant breeders' rights for its government bred varieties. The royalties paid to the Institute were paid to the Treasury. The breeders themselves did not benefit directly. The royalty figures were used to try and get more money invested in plant breeding within the Government. Nowadays breeding is carried out in other sectors and nothing is left in Government.

2. <u>Dr. S. Muliokela</u> (Zambia) asked <u>Mr. David Boreham</u> (United Kingdom) about the fee structure and whether a calculation had been attempted over a period of the licensing of what percentage of the cost the fees were, in terms of the value of the seed.

<u>Mr. D. Boreham</u> (United Kingdom) answered the question from another angle. The fee structures, he said, were far from arbitrary, but rather designed to cover the full costs of the plant breeders' rights system. He said that in the United Kingdom careful record was kept of the resources that were used and it was a government requirement to recover the full cost from plant breeders. He went on to say that it was impossible to estimate costs on an individual application and that the costs were spread over all the applications. The judgment of whether the proportion of the costs of protection to the value of seed was appropriate was one for the breeder to make.

3. <u>Dr. S. Muliokela</u> (Zambia) asked what would happen in a situation where the contractors, and other people carrying out the DUS testing, failed to give results due to a natural disaster which affected the test, when the breeders had paid already. He asked who would be responsible for the costs then.

<u>Mr. D. Boreham</u> (United Kingdom) said that he hoped such a situation would never arise. He also said that there had been detailed discussions with plant breeders on how far and how many sites would be used without running the kind of risk described. He said that it was a very difficult hypothetical question to answer.

<u>Mr. A.J. Cronje</u> (South Africa) commented that the climate in South Africa was without extremes of cold. Some of the problems could be solved because summer crops could be planted in winter and some crops could be put in "protected environments," (glasshouses, etc.) and results can then be achieved in a relatively short time.

<u>Dr. W. van der Walt</u> (South Africa), regarding the source of funding or benefits for government breeders, commented that it was noticeable worldwide in developing countries, and in developed countries, that there was a trend for governments to get out of agricultural research. One source of income for a government institution would be the royalties, but royalties would never be able to carry all the costs involved in a plant breeding project.

4. <u>Dr. J. Mushonga</u> (Zimbabwe) asked how successful the results of bilateral testing agreements were if one were to take into account the different ecological environments.

<u>Mr. D. Boreham</u> answered that if one had signed an agreement on bilateral testing with other countries then one would already have to be satisfied with the testing regime and the circumstances of the country involved. One of the main aims was to minimize the effect of environment. It was advisable to sign agreements with countries that already had experience and expertise in variety testing of different crops for different countries.

5. <u>Dr. J. Mushonga</u> said that he realized that in the rest of Africa (South Africa excepted) governments were involved in the breeding of sorghum. The Government of Zimbabwe was worried about small scale farmers growing millet and sorghum. The private sector was not interested in the breeding programs for developing these crops. He asked how a similar situation to the one mentioned in the United Kingdom, where major plant breeding was in the hands of the private sector, could be addressed in Africa.

<u>Mr. D. Boreham</u> answered that there were many facets which were different in the two countries. Firstly that there were large-scale breeding programs in the United Kingdom and secondly, that the government felt it appropriate to let the market decide.

<u>Dr. R. Ellis</u> said that this was a very important point because within Africa small scale farmers were working on improving their own species and were selecting their crops year by year for their own specific needs. A system was needed whereby farmers were rewarded for their work. If support from the public sector was superseded by commercial systems, some difficulties could arise.

<u>Dr. W. Van der Walt</u> comments were that there were no clear cut answers to this problem, but that a few options should be made available. Firstly, if any individual or community develops something that qualifies for plant breeders' rights, he or it should take the option of getting royalties from the commercial sector; Secondly, potential food plants/crops/ and herbal/medicinal plants should be supported by government grants or partnerships between government and multinational or international bodies, so that these varieties could be handed back to the communities in an improved condition; Thirdly, the risk, not only in South Africa, but worldwide, of a loss of indigenous biodiversity should be countered by government-supported nurseries, which were actively engaged in maintaining biodiversity. He thought that there should be more support.

<u>Dr. A. Whittle</u> (Malawi) commented that one possible solution could be the way the Tea Research Foundation, which has major breeding programs, was funded. The Foundation is supported entirely by the private sectors of Malawi, Zimbabwe and South Africa. No individual country has a large enough industry to sustain programs of this kind on its own.

6. <u>Mr. B. Featonby-Smith</u> (South Africa), referring to the subject of bilateral agreements and the characterization of standards (for testing), asked who set the standard and how the system was coordinated.

<u>Mr. D. Boreham</u> (United Kingdom) answered that UPOV played an extremely important role in this regard, and that all countries had similar standards and protocols based on UPOV recommendations, which resulted from contributions by all member States, through participation. He emphasized the need for discussions between countries and breeders. The UPOV approach was a world wide one.

PLANT VARIETY PROTECTION AND VEGETATIVELY PROPAGATED CROPS IN SOUTH AFRICA

by

Mr. J.G. Niederwieser, Agricultural Research Council, Vegetable and Ornamental Plant Institute, Pretoria, South Africa

1. Introduction

Vegetatively propagated crops include

- Fruits such as peaches, apples and grapes.
- Subtropical fruits such as citrus and avocado
- Some of the most important flower crops namely roses and chrysanthemums
- The biggest vegetable crop in South Africa, namely: potato.

A special characteristic of all these crops is that they are propagated by means of a cutting, an off set or storage organs. The advantage of vegetative propagation is that millions of plants, identical to one original plant, can be obtained. The disadvantage, however, is that disease present in the mother plant are propagated along with the cuttings. To realize profitable production, plant improvement schemes (disease free plants are maintained and propagated through various stages) are normally established.

In South Africa both fruit and flowers are important export crops. The production of these crops is therefore important for job security and foreign exchange earning.

2. <u>The Objective of Variety Protection is to Protect the Right of Plant Breeders</u>. Do we Need to Breed New Varieties?

(i) Responsible breeders maintain an extensive genebank. In this way biodiversity is conserved.

(ii) The competitive nature of horticulture requires high productivity. Breeding is an effective, environment friendly way to increase productivity.

(iii) Breeding for tolerance or resistance to diseases is important since the availability of effective, safe agrochemicals are becoming limited.

(iv) The climate, soil and other environmental conditions in South Africa are different to these prevailing in other countries. We need to develop our own (well adapted) varieties. This is particularly important for food security.

(v) The flower industry is extremely dependent on a continuous supply of new varieties and products.

(vi) Breeders often maintain a nuclear stock of disease free plants which are made available to growers.

3. <u>Why is it Important for Countries in Southern Africa to have Laws to Protect the Rights</u> of Plant Breeders?

(i) Breeding is important for horticulture to provide improved and new varieties. The flower industry is especially dependent on the introduction of new varieties and crops to maintain a market share.

(ii) Development of new and improved varieties will not be stimulated unless rights of plant breeders are protected. Plant breeding is an expensive, long term investment. As more and more breeding is being done by private or parastatal institutions, breeders need to be satisfied that they will have a return on their investment.

(iii) Growers can be denied the availability of new varieties if breeders feel that they enjoy inadequate protection.

(iv) The International Community of Breeders of Asexually Reproduced Ornamental and Fruit-Tree Varieties (CIOPORA) is pressing for legislation whereby cut flowers which are cultivated illegally can be destroyed when they reach customs of the importing country. Not only may such growers be forced to accept the term of the license, they will certainly lose a lot of money.

(v) Breeders have an obligation to provide their licensees with the propagating material. Legal licensees are in a favorable position to obtain material which is true-to-type and free of important diseases.

FOURTH SESSION: PLANT VARIETY PROTECTION IN THE SOUTHERN AFRICAN REGION

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

CURRENT SITUATION IN THE PLANT BREEDING AND SEED INDUSTRIES IN THE SOUTHERN AFRICAN REGION; POLICY ON THE PROTECTION OF NEW VARIETIES

Lesotho

Mr. R.N. Lepheane, Mr. G.L. Makhale and Mr. M.M. Ranthamane, Crops Department, Ministry of Agriculture

Malawi

Dr. Allan J. Chiyembekeza, Groundnut Breeder, and Dr. Jeffrey H.C. Luhanga, Deputy Chief Agricultural Research Officer, Chitedze Agricultural Research Station, Lilongwe

Namibia

Mr. S. A. Ipinge, Agricultural Research Officer, Omahenene Research Station, Oshakati, and Mrs. Bianca Rusch, Agricultural Research Officer, Ministry of Agriculture, Water and Rural Development, Windhoek

Swaziland

Douglas Gama, Arthur Similane, Sipho Similane, Malkerns Research Station, Malkerns

Tanzania

Dr. G.A. Mwakatundu, Commissioner for Agriculture and Livestock Development, Ms. Christine Bandawe, and Mr. E.J. Lujuo, National Seed Coordinator, Ministry of Agriculture

Zambia

Dr. E.D. Zulu, Seed Control and Certification Institute, Chilanga

THE CURRENT SITUATION OF PLANT BREEDING AND SEED INDUSTRIES IN LESOTHO

by N. Lepheane, G.L. Makhale and M.M. Ranthamane, Ministry of Agriculture, Lesotho

1. Introduction

Lesotho covers an area of 3 058 800 ha, which from an agricultural point of view can be divided into three main categories (Table 1). These are the arable land, permanent pasture and other land. The country is further divided into four agro-ecological zones, namely, the Mountains, Foothills, Lowlands and Orange River Valley (Table 2). The country is completely surrounded by the Republic of South Africa.

Table 1: Land Use categories in Lesotho

Туре	Area (milli	on Ha) Proportion (%)
Cropping	0.30	10
Grazing	0.50	83
Other	0.23	7
Total	2.03	100

Table 2 : Agro-ecological zones in Lesotho

Remarks	Zone	Altitude	
Lowlands	1500 - 1800m	15% of total area	
Foothills	1800 - 2200m	10 - 15% of total area	
Mountains	2200 - 3000m		
Orange River Valley	1500 - 1800m	Extension of the Lowlands into the eastern	
		mountain along the Senqu (Orange) River	

1.2 Agriculture

The climate in Lesotho is semi-humid to semi-arid with an average annual rainfall of 760 mm and a relative humidity of 45 to 85% being lowest in the months of August and September. The annual rainfall varies from 500 mm in the Southwestern parts of the country to about 1000 mm high up in the mountains and occurs mainly between October to April.

It is generally cold in Lesotho in winter with night temperatures below O^oc and snowfall in the mountains, where also frosts can occur anytime of the year. In the lowlands and foothills summers are normally frost free, with cool nights and warm days. There are no commercial farms in Lesotho and crop production is based on small scale farmers with average field size of 3 - 4 ha. The commercial farmers depends on leasing land from the subsistent farmers.

Despite these constraints, eighty-five percent in Lesotho live in rural areas and are depended on Agriculture for their livelihood in one way or another. They practice mixed farming of crops and livestock and are mainly subsistence farmers although lately commercial farming is gathering momentum.

The arable land in Lesotho is around 400 000 ha although on the average annual planted area is about 330 000 ha of which 305 000 ha are summer, 25 000 ha winter crops and 2000 ha for vegetables. The major field crops are maize, sorghum, wheat (Spring and Winter), beans and peas (Spring and Winter)

2. The Seed Sector

2.1 Plant Breeding Research

There is no plant breeding program in the country. The Agricultural Research Division of the Ministry of Agriculture is responsible for the introduction of new varieties.

This Division collaborates with several agricultural research networks internationally and regionally. These centers are the source of new cultivars which are normally introduced as breeders seed after having been subjected to various tests.

After screening all varieties are passed over to the seed Multiplication Unit for propagation and subsequent distribution to farmers. Since there are no normal seed committees in the country our Research Division is responsible for the introduction, evaluations as well as release of new varieties. For maintenance of these, the Division and the S.M.U. work together.

2.2 Seed Production

The Organization responsible for local seed production are the Seed Multiplication Unit (S.M.U) and the Lesotho-American Hi-bred Seeds. (LAHS). The LAHS was in operation from 1990 until 1994. It was a private company, a joint venture by Pioneer Hybrid International, Lesotho National Development Corporation, Lesotho Agricultural Development Bank and private company Agrivet.

The S.M.U., established in 1971, was developed from a former Wheat Seed Multiplication Unit. It is a section in the Department of Crops of the Ministry of Agriculture, Cooperatives, Marketing and Youth Affairs. It has two components, seed production and seed quality control. Its main activities include:

– Production of basic seed

110. THE NATURE OF AND RATIONALE FOR THE PROTECTION OF PLANT VARIETIES UNDER THE UPOV CONVENTION

- Multiplication of seed for the supply of certified seed to the farming community.
- Seed quality control and certification.
- Organization of distribution and marketing of locally produced seed.
- Cultivar maintenance.

Presently the Unit deals with potatoes, wheat, beans, and to some extent highland maize. Sorghum and groundnuts are the new entrants.

The system used is the contract seed growers scheme in the form of individual farmers and associations/groups, in other words on-farm seed production by small-scale farmers. In the case of associations, farmers are advanced loans to cover all inputs and the loan is paid after harvest. In this scheme the S.M.U. organizes the marketing or buys the produce itself. The state farms are mainly used for the production of basic seed.

2.3 Seed demand and local production.

Although there is a potential for expansion and increased production of the seed of open pollinated varieties of self-pollinated crops, presently the level of production is as in table 3.

Сгор	Production (Tons)	Percentage Self-sufficiency
Maize*	400	20
Wheat	300	25
Sorghum*	200	33
Potatoes	80	8
Beans	55	7
Highland maize	20	5

Table 3: Seed production status

* These are hybrids produced by LAHS.

From the figures above it is obvious that the local seed demand is met through imports.

2.4. Seed Quality Control

As stated earlier this service falls within the S.M.U. responsibilities. The service includes field inspections, laboratory seed testing and certification.

The country uses minimum quality standards and although it is not a member of ISTA, most of the laboratory tests are based on ISTA rules. A certification scheme based on OECD is in operation.

3. Legislation

There is no overall seed legislation in the country. Plant breeders rights are also nonexistent. There are certain standards covering;

- rules for seed growing covering wheat, peas and beans issued in May 1970.
- Standards for potato seed production and certification, 1967/68
- Growers application and registration forms

A comprehensive draft "Lesotho Seed Act" has been submitted to appropriate authorities. But as mentioned earlier for certification the OECD scheme and the ISTA rules are utilized.

THE CURRENT SITUATION OF PLANT BREEDING AND SEED INDUSTRIES IN NAMIBIA

by

Mr. S. A. Ipinge, Agricultural Research Officer, Omahenene Research Station, Oshakati, and Mrs. Bianca Rusch, Agricultural Research Officer, Ministry of Agriculture, Water and Rural Development, Windhoek

In Namibia only one formal crop improvement program, the Sorghum and Pearl Millet Improvement Program in northern Namibia, is being undertaken. The objectives of this program are to increase production in the subsistence farming sector for increased food security through multipurpose millets with increased grain yield and yield stability, to diversify the genetic base of pearl millet lines and populations, to evaluate alternative selection criteria and breeding methods and develop cultivars that are suitable and adapted to the Namibian subsistence farming conditions. This program is a collaborative effort between SADC/ICRISAT (SMIP) and the national program of the Ministry of Agriculture, Water and Rural Development (MAWRD), Division Research and Training, of Namibia. No private enterprise is active in plant breeding and crop development or utilization of local plant genetic resources in Namibia.

Okashana I is presently the only improved pearl millet variety released officially to Namibian farmers. An extensive diffusion and adoption survey is presently being undertaken by SADC/ICRISAT (SMIP) and the MAWRD. A seed testing and distribution system for Okashana I is in the process of being established by the government. Seed is produced on research stations and by FAO-funded small-scale seed production system involving selected local farmers since 1994. The ultimate goal is to form a farmers' seed coop under government control in about three years time. Seed is to be tested and certified according to international standards at the newly established seed testing station at Mahenene Research Station. Legislation governing registration, import, sale and distribution of seeds is still that of the Republic of South Africa. Since Pearl Millet was not considered a crop in those days, no legislation exists for it yet. The harmonization of seed laws in SADC is being undertaken. In future, similar production and supply systems for open pollinated maize and legume seeds are planned.

Up to now, local plant genetic resources have not been utilized extensively on a scientific basis and therefore their value is generally undetermined. However, from the available 1100 pearl millet landrace accessions, three genepools were made, five varieties were identified and three new varieties were bred by backcrossing landraces to Okashana I. These varieties are now undergoing multi-locational testing before being released. Presently there exists no procedure for formal release and registration of new varieties in Namibia. Since there has up to now not been much activity in producing new crop varieties in Namibia, no system of incentives for plant breeders is developed. Since the only plant breeding activity at the moment rests with government institutions, it is not foreseeable that such incentives will be introduced.

The Constitution of Namibia (Article 95(1)) protects natural resources in general and promotes their sustainable use, but no legislation to specifically protect landraces exists. From the limited knowledge available however, it seems that local material has great potential

value from which profits could be derived in future. New sources of food, medicinal and industrial products may be present amongst the wild genetic resources of Namibia. The landraces of pearl millet are well adapted to the conditions in the country, have extreme vigor and good grain quality suitable for commercial milling. Improving the yield, pest and disease resistance would be all that is needed.

By maintaining a national plant genetic resources program linked to SADC/ICPPGR, the government wants to ensure protection, conservation and utilization of the country's indigenous plant genetic resources. At present plant genetic resources collections are not fully protected by Namibian legislation and over the past two years it has become apparent that Namibia's plant genetic resources and information gained from using them need to be better protected by legislation. Agreements will in future be signed to clearly spell out the obligations of the user and supplier of germplasm to ensure mutual benefit.

Namibia's Needs:

The seed production and supply system and accompanying legislation for all crops in Namibia need to be fully implemented and/or revised.

Research on phytosanitary matters such as plant pests and diseases, quarantine and biosafety, urgently needs to be done in order to revise legislation pertaining to the import and export of plant material. This legislation should include import of new cultivars for planting to control quality of imported material and safety of existing local genetic resources.

National legislation on collection and exploitation of local genetic resources needs to be formulated and enacted. This legislation should empower the national program to enter into mutual agreements, ensuring mutual benefit for users and suppliers of plant genetic resources.

Legislation on intellectual property rights needs attention.

THE CURRENT SITUATION OF PLANT BREEDING AND SEED INDUSTRIES IN SWAZILAND

by Mr. Douglas Gama, Mr. Arthur Similane and Mr. Sipho Simelane, Malkerns, Swaziland

1. Introduction

Swaziland covers an area of 17,364 km and lies between the 25th and 27th parallels in South-Eastern Africa. The country is surrounded by the Republic of South Africa to the north, west and south, and Mozambique to the east.

The population is estimated at 800,000 of which more than 70% is dependent on agriculture for its livelihood.

There are two systems of land tenure. The traditional system of dependency rights operates on Swazi National Land, where the average holding is about 2 ha. This covers 56% of the total land area with the remaining 44% held under individual or freehold title.

The small size of the country and land tenure system have significant implications on the production of hybrid seed, especially for cross pollinating crops. The size determines the extent of production per given season without the infringement of isolation requirements. The land tenure system disqualifies the majority of farmers on Swazi National Land since isolation requirements cannot be fulfilled. The latter connotes an unfavorable political perspective.

2. The Seed Industry

Swaziland was an absolute seed importer until 1978 when the Government, with the assistance of the FAO and Danish International Development Agency (DANIDA) funding, initiated a seed multiplication project.

At the onset of the project, two technical wings were recognized. These are the Production, Processing and Marketing and the Seed Quality Control Services. The two subsectors were under one administrative umbrella until 1987, when they separated.

Since the separation, the Seed Quality Control Services has remained a government section under the Ministry of Agriculture and Cooperatives (MOAC), while the commercial wing has since been privatized with the termination of FAO assistance in 1992.

The private company is a joint venture between Pioneer Hi-bred International, which is a major shareholder, and the Swaziland Government.

The company is involved in the production, processing and marketing of hybrid maize and bean seeds. The market share, inclusive of proprietary and non-proprietary varieties, is estimated at 75% for hybrid maize seed and negligible for beans.

3. Crop Improvement

The only in-country breeding program is for cotton which is the responsibility of the Cotton Board.

Prior to privatization, the company relied on non-proprietary varieties from various South African seed companies. Parent lines would be imported from the respective companies for multiplication to certified seed under the country's certification scheme.

Since the privatization, only proprietary varieties are multiplied and non-proprietary varieties imported as certified seed. The company has its breeding program and multiplication of early generations in Zimbabwe.

International organizations such as ICRISAT and IITA are also utilized as sources of new leguminous material. However, the multiplication of these from breeders to certified seed level is not clearly defined and therefore farmers may be denied exploitation of the improved material.

3 <u>Seed Legislation</u>

Swaziland has a National Seed Policy which was drafted in 1993. The policy outlines strategies to initiate and develop the various components of the local seed industry. It also provides for the appointment and representation of a national seed committee to guide and develop the seed program.

The country also has a seed legislation complimented with rules and regulations to ensure the availability of good quality seed of improved varieties. The law designates the seed quality control services as authority to execute its mandates and regulate the various components of the industry.

Other provisions include:

- Recognitions of certain varieties, their release being the perogative of the Variety Release Committee
- Registration of establishments where seeds for the purpose of sowing may be cleaned and packed or offered for sale.
- Conditions under which seed may be sold
- Requirements relating to seed, packaging material, seals and labels, and
- The control of importation and exportation of seeds.

Most of the requirements are being effected but apply to stipulated kinds of seed sold through the formal seed sector.

4. Infrastructure

The Swazi-American (PHI) Seeds Company has up-to-date seed processing equipment including cob dryers and a conditioning and packaging plant.

The Seed Control Service has a well-equipped laboratory with a capacity to test more than 3000 seed samples of diverse species per year.

5. Membership of UPOV

The Government is aware of the significance of improved seed in crop production improvement, but due to a lack of resources, it has not been able to finance the public breeding program.

The absence of plant breeders' rights, limited in-country seed market and easy access to improved varieties developed in South Africa, could account for the lack of private breeders in the country.

Albeit aware of the important role UPOV is playing in encouraging investment in plant breeding work, it would be premature for Swaziland to join the organization. This is because it would be difficult to convince the Government that the country would benefit from such an endeavor.

THE CURRENT SITUATION OF PLANT BREEDING AND SEED INDUSTRIES IN TANZANIA

by

Dr. G.A. Mwakatundu, Commissioner for Agriculture and Livestock Development, Ms. Christine Bandawe & Mr. E.J. Lujuo, National Seed Coordinator, Ministry of Agriculture, Dar-es-Salaam

1. Background

1.1 Location

Tanzania is located between I° North and 12° South of Equator with a territorial area of about 945,000 km² (the land area is about 886,000 km²) and a wide ecological diversity. The population is about 30 million people with an average density of about 26 persons per km² and a growth rate of 2.8% per year. About 85% of the population lives in rural areas fully engaged in agriculture and livestock production.

2. Profile Of Agriculture

Agriculture is Tanzania's key economic sector. It accounts for about half of the country's GDP, for more than 80% of recorded export earnings and for 90% of rural employment. The sector is also the main source of food for the nation and of raw materials for agro-industries. In addition, the rural populace which accounts for over 85 % of Tanzanians, is the major consumer of the nation's goods and services.

Tanzania has approximately 41.6 million hectares of arable land, only 12% of it is suitable for irrigation. Overall, only about 15% of the arable land is under actual cultivation. This indicates the enormous potential still untapped for agricultural development in the country.

Rainfall is considered adequate and is both bimodal and monomodal. Precipitation ranges between less than 500 mm in the central part of the country to over 2,000 mm (bimodal) in the northeastern and south western highlands.

The important food crops are maize, cassava, rice, sorghum, millets, grain legumes, bananas, wheat, sweet potatoes, round potatoes, vegetables and sugarcane. The main cash crops are coffee, cotton, tea, tobacco, sisal, pyrethrum, cashew nuts and cloves.

3. Research And Plant Breeding

In recognition of the importance of providing farmers with superior varieties, specific research programs in Tanzania are charged with the task of developing and evaluating new cultivars of food and cash crops. Plant breeding and research activities are government led and funded through the Ministry of Agriculture (MOA), the donor community supplements with budgetary allocations. The parastatal sector collaborates with the government in development of new varieties particularly for commercial crops. The private sector is primarily introducing their own developed varieties and conduct trials multi-locally with the

national programs with the objective of releasing them. This work is basically centered on food crops. The University of Agriculture (Sokoine University) integrates research and development, extension and education and does collaborate with the MOA crop programs. However, the art of plant breeding and research development is open both to the public and the private sector. The National Crop Programs are vested with the responsibility of coordination.

The components of plant breeding and research are the Central Research and Training Institutes and their sub-stations actively engaged in various disciplines of crops and livestock research. Crop and livestock research Coordinating Committees are established which deal with specific research programs. A coordinator is assigned to amalgamate the efforts of various disciplines for a particular crop. These crop improvement programs develop varieties through sources of materials either through introductions from International Research Centers or entirely from the National breeding programs. Potentially developed candidate varieties after rigorous field trials are applied to the National Variety release and Certification Committee by a respective breeder for scrutiny and release. The Committee meets once a year before the growing season and reviews materials developed by both the public and the private sector.

The national crop improvement programs are major sources of superior varieties of both food and cash crops being used in the country. Those programs have developed many varieties of various crops which include several maize hybrids which are currently being used by farmers. The private sector has released a number of hybrid maize and sunflower varieties, this is a contribution by CARGILL Hybrid Seeds, PANNAR and PIONEER HI-BRED Companies. The hybridization concept is steadily picking up especially in high potential high rainfall areas.

4. National Seed Industry Program

A systematic seed industry was established in 1971 with the major objective of making the country food self-sufficient. The components of the industry for long were composed of three institutions:- National Foundation Seed Farms, Tanzania Seed Company (TANSEED) and the Tanzania Official Certification Agency (TOSCA). Foundation Seed Farms under the MOA are officially charged with the multiplication of all public varieties into Foundation stage on contract with TANSEED and other commercial companies at the present. TANSEED a parastatal organization was/is mandated to produce, process, market and distribute certified seeds to cover national demand. However, this responsibility has been heavy; as a result of the intensity of crop varieties and the diversity and complexity of the country, targets have never been met. The seed quality control wing TOSCA, consists of three zone laboratories charged with seed inspection, seed testing and certification. This background information clearly shows that the industry for about two decades was exclusively run and managed by the Government. The seed program for that period succeeded in supplying about 10% of certified seed material to the farming community leaving an enormous gap. Farmers have been using "farm saved" seed from sources of improved and recycled generations and from local land races. This condition whereby low levels of improved seed is reaching farmers prompted the Government to adopt a new strategy for alleviating the situation. A National Seed Industry Development Program was developed in September, 1989 with the major objective of revitalizing state services (plant breeding and

research, seed farms, seed quality control and extension services) and putting in place a commercial and viable seed-subsector which will be self-sustaining instead of TANSEED. Tanzania Seed Company is to become privatized and more private and commercial seed entities local and multi-national were encouraged to participate in the area of seed research, production and delivery. The National economic reform changes liberalized the seed commercial subsector, therefore seed was made a free market commodity and seed prices decontrolled.

As a result of seed trade liberalization, a number of private seed companies are participating in production and supply. CARGILL Hybrid Seed Company became registered in April 1990 followed by another ALPHA Seeds (1993) a local company primarily engaged in vegetable seed production and distribution. Two other multi-national Seed Companies PANNAR (PVT) Ltd and Pioneer Hi-bred International Incorporated (PHI) have tested and released their maize and sunflower materials. PANNAR has four hybrid maize varieties (PAN 6549, PAN 695, PAN 6195 and PAN 6481) undergoing test marketing and production while PHI is seeking an agent to market their two varieties (Phb 3435, Phb 3253). So far CARGILL hybrid seeds has contributed four (4) varieties two (2) of maize and two (2) of sunflower (maize C6222 and C4142, sunflower S400 & S430). The private companies are at liberty to use public bred varieties by abiding to conditions of exchange laid down by the Government. This facility has been installed in order to encourage competition and enhance the flow of seed to farmers. The creation of an enabling environment for both local and international seed houses is providing farmers with a wider choice of cultivars and easy access to them. Availability of adequate quantities and quality seed is assumed to increase local production and productivity as the seed industry expands and matures. However, the flow of varieties requires the recognition and installation of a plant breeders rights legislation.

5. Plant Breeders' Rights In Tanzania

The Ministry of Agriculture adopted a National Seed Policy in February, 1994 which requires among other things that a plant breeder's rights legislation should be enacted promptly in order to facilitate and encourage the growth and privatization of Tanzania's seed industry. The Government, FAO and UNDP recruited a consultant in November, 1994 who was required to collect and assess relevant data and information on plant breeders' rights, review and define requirements for plant breeders' rights and prepare a draft legislation for protection of rights of private and institutional researchers regarding creation of varieties and hybrids. The legislative proposal contained therein attempts to balance the enunciated objective against the more general objectives of the national seed program and the agricultural sector. The proposed act also expresses concern and consideration on the following areas:

- the extent to which government's non-monetary objectives (food security, improvement of agriculture in small, remote or other low value markets, etc.) will be reflected in PBR legislation;

- government's ability and intent to maintain control over its parent stock and other valuable breeding material and information for purposes of exclusive breeding of its proprietary lines of various species;

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- the manner in which government royalties will be negotiated, collected and utilized;

 (in the light of the foregoing) the extent to which incentives and encouragement may be offered to government plant breeders, to maintain the existing government breeding program;

- the effect of the practice of seed saving by the majority of Tanzania's farmers on the value and practicality of PBR legislation;

- specifically protect the rights of farmers to "save seeds" from one crop of a protected variety for use in later years, and of researchers to use new varieties in their research;

- the potential for the seed program, if it is too successful, to have a substantial negative effect on agricultural biodiversity;

- the possibility that protected varieties may be used by unlicensed parties in research (especially biotechnical research and other activities utilizing technological advances not available to government researchers) in ways that derogate the rights and expectations of the breeder;

- the extent to which the breeders' relationships with international germplasm banks will be affected by the introduction of PBR in the country;

- the need to exert a stronger mandate on plant breeders and the plant breeding program to remain active in the maintenance of their varieties;

- the need to limit the application of seed and variety laws and agencies to species of value to the country;

- specifically mandate the limitation of the application of plant breeders' rights to crops and other species that are of commercial or other value to the United Republic;

- coordination of Tanzania's PBR system with other nearby countries, in the expectation of a future agreement regarding reciprocal enforcement of PBR with other countries in the region;

- the possibility that Tanzania, or a regional organization of which Tanzania is a part, might join UPOV in the future;

- the need for recognition of the contribution of traditional farmers in the custodianship and preservation of traditional varieties;

- create a fund using a portion of the fees paid under the act for the purpose of benefiting traditional farmers and compensating them for the use of traditional cultivars in the breeding process;

- (notwithstanding the above exception) require persons using a protected variety in biotechnological research to compensate the holder of the plant breeders' rights in that variety;

The consultants proposed draft legislation has been widely distributed to various professionals in agriculture, legal circles and universitites for review and comments. After final amendments have been carried by the Attorney General's chamber, it will be submitted to the Parliament before the end of this year for enactment into a law.

THE CURRENT SITUATION OF PLANT BREEDING AND SEED INDUSTRIES IN ZAMBIA

by Dr. E.D. Zulu, Seed Control and Certification Institute, Chilanga

Introduction

The Zambian agricultural industry in general has undergone remarkable transformations since the pre-independence days. The changes have also significantly influenced the thinking and general direction of the seed industry in general and policies related to variety protection.

During the period before independence (1964) and during the Federation of Rhodesia and Nyasaland, crop breeding was mainly done in Zimbabwe. Zambia was only a trial site for agronomic evaluation of varieties in federal breeding programs. There was no breeding work done in Zambia and at the time the only maize variety SR52 was brought into the country through federal arrangements. The bulk of certified seed was organized and produced from Zimbabwe. At the time Zambia had only three registered seed growers. Most of the seed requirements, therefore, had to be met through imports in most cases from Southern Rhodesia (Zimbabwe) and South Africa.

Immediately after independence (1965), there was an urgent need to start a maize breeding program in Zambia. The main objectives of these programs were mainly that the maintaining and increasing parent lines of SR52 in order to start hybrid seed production in the country. In the early 1970's the first local maize composites were developed and released for commercial production. The program expanded rapidly and included other important staple crops in the 80s and 90s. More superior and breeding varieties of maize, sorghum, pearl millet, sweet potatoes, cassava were bred and released by government breeders. All the breeding work was done by government breeders. There was no private involvement in breeding other than the university of Zambia which offered some partnership in breeding. The result was that the need for plant variety protection did not arise.

Seed production was organized by Seed Services, now the Seed Control and Certification Institute (SCCI), a quality control department within the Ministry of Agriculture, Food and Fisheries (MAFF). This was done through contracts with individual and state farms. The same section was also responsible for maintenance breeding of varieties that were in circulation.

Inherent in this organizational set up and operation were the following problems:

(a) SCCI could not cope with the demands of maintenance breeding which resulted in the loss of genetic purity of parent materials. There was also a lack of regular supplies of breeder's seed which resulted in re-circulation of seed more than was desirable;

(b) There was no systematic way of variety testing and release procedures and varietal descriptions were not adequate and this made field inspections and seed production difficult;

(c) Heavily controlled prices of seed failed to attract sufficient number of farmers to grow seeds;

(d) The principle of self control rendered field work ineffective.

As a result of the above constraints, the seed delivery system became weak. The only superior maize hybrid SR52 grown in Zambia became contaminated. It was yielding 20% lower than the same variety grown in Zimbabwe. The government, however, realized the need to improved the situation and as a result it decided to separate the functions of production and marketing from those of quality control and breeding. In that respect therefore, a national seed company to be wholly responsible for production and marketing of all seeds in the country was to be formed and this led to the formation of Zambia Seed Company Limited in 1981. The National Variety Release Committee was formed in 1984 to test and release varieties bred in Zambia and at the same time publish a list of recommended varieties. Plant breeding and maintenance was done by government and all the varieties from the breeding institutions were given to Zambia Seed Company for the purpose of production and marketing.

During this period the economy was characterized by low productivity and inefficiency in all sectors due to excessive government intervention and control of markets in which the provision of essential public services was rather inadequate.

Marketing of most commodities was monopolized by either parastatals or government appointed agents such as cooperatives. Marketing of certain commodities was the exclusive preserve of specified organizations. For example, Zambia Seed Company retained the monopoly over seed marketing. For a number of commodities, both procurement and sale prices were regulated by government. This facilitated the administration of subsidies which were intended to keep consumer prices low. Transport rates were fixed and transport costs were subsidized so that uniform prices could be maintained across the country.

International trade was either banned or highly regulated with the result that large incentives to smuggle often existed. There was an excessive promotion of maize at the expense of other crops.

Current Situation (1991 and beyond)

The agricultural sector is rapidly evolving from a highly controlled and regulated industry into one that is fully liberalized and driven by market forces.

The government has since withdrawn from agricultural marketing and input supply. It has freed prices, removed subsidies and privatized some parastatal companies.

Seed Production and Marketing

A situation is now developing where more companies have entered the seed market. As a result, farmers are suddenly having a wide variety of products where they can make a choice. The seed market is getting more competitive. The trade or brand name of the company now bears proof or symbol of quality rather than a seal from the government quality control department as in the past.

Plant Breeding

Although the bulk of plant breeding is still being done by the government, there is scope for a number of research activities to be privatized. Already research activities in such crops as tea and sugarcane have been taken over by industry. A number of crops still show promise for privatized breeding. Such crops include maize, cotton, cashew nut, sunflower, sorghum and kenaf.

To achieve this, a Research Trust has been established to take up research work of certain profitable crops. The government will continue to support research in small crops such as cowpeas, pearl millet, finger millet, etc. Although a number of seed companies have entered the seed market with their own materials, it is envisaged that they too will engage in plant breeding. Zambia Seed Company still holds exclusive rights to reproduce, process and market varieties bred by the government research organization. In turn the company has been funding such efforts. It is envisaged that in future the government would open their varieties to other companies in return for royalty.

Seed Quality Control and Certification

As the government resources started to dwindle, it became apparent that the government could not support a comprehensive program on seed quality controls and therefore the need to trim government involved in this sphere. Need has therefore arisen to stimulate private participation in quality controls in general.

To achieve this, the Seeds Act has been revised to provide for active participation by the private sector in the area of quality control. The Seed Control and Certification Institute in the past was expected to provide labels and seals to seed producers. This activity has since been taken back to companies and SCCI only sets the guidelines for labeling and sealing.

The Seeds Act has also been amended to provide for the establishment and licensing of private seed testing laboratories. When licensed, the private companies will have the powers to perform all the necessary laboratory tests. In order for a company to obtain a license it will have to show that it has a capacity in terms of equipment, suitable working space and trained personnel. A monitoring system is being worked out whereby 10 - 20% of samples will have reserved portions for confirmation test by the government laboratory. The same laboratory will also run a referee test scheme for all licensed laboratories in order to establish whether the same are operating within tolerances.

Seed company personnel will also be licensed in their individual capacity to carry out field inspections, seed sampling and seed testing. The government seed inspectors will only verify that such personnel operate within the stipulated rules.

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Policy on Plant Variety Protection

Plant variety protection was not formally recognized as an essential tool in the development of the agricultural and the seed industry in particular, until three years ago when the overall economic liberalization began. As soon as a number of seed companies started seed businesses in Zambia, there had been a general concern that most of the superior public materials might be pirated. On the other hand, companies wishing to invest in Zambia were equally concerned that their materials would not be safe in Zambia and as a result many could not bring with them the best materials. The certification institute too, was denied access to parent materials in order to document the descriptors of each for the purpose of field inspections and also to establish ownership in a situation where there was a dispute. As a result of that, the government of Zambia realized the need to have a suitable piece of legislation in place as soon as practicable.

Plant breeders rights legislation is not yet established. However, it is expected that once the draft Act is finalized and approved by parliament, then the rights will be implemented. There is debate as to whether the country can be a member of UPOV at this stage. The draft Act has been circulated to UPOV. We have received some very useful comments. These have now been incorporated. A second version of the Act has been produced. This has been circulated to the seed industry and other interested parties for discussion. Preliminary discussions have also centered on whether Zambia should comply with the 1978 or 1991 Acts of the UPOV Convention. We are hoping when all is said and done, Zambia will have an adequate legislation on plant variety protection in the next 24 - 36 months.

GENERAL DISCUSSIONS

1. <u>Dr. S. Muliokela</u> (Zambia), expressed the view that the Tanzanian legislation appeared complex and hard to administer because it entailed more than one piece of legislation. Biodiversity was governed by the Rio Convention and each country was supposed to conform to the Convention. He asked how Tanzania expected to monitor farmer's rights and what the costs would be for the legislation.

<u>Mr. E. Lujuo</u> (Tanzania) answered that the issue of biodiversity in plant breeders' rights had not been addressed. He said that at the moment concentration was on varieties that were of importance to the national interest. The farmer's right issue was not dealt with in proposed legislation.

2. <u>Dr. J. Mushonga</u> (Zimbabwe) asked about the talk he had heard on privatization of varieties and, perhaps, related companies and asked which varieties were privatized.

<u>Mr. E. Zulu</u> (Zambia) answered that this referred to crops and not varieties as such and that these were programs which were carried out by the private sector, i.e. for sugarcane and coffee.

<u>Mr. Greengrass</u> asked the countries represented, what, if any, activity connected with UPOV they would be interested in for the future. Would they be needing help with legislation and were they interested in the organization of national seminars? UPOV saw the Seminar in Pretoria as being necessary to bring people in the region together to discuss plant variety protection. For UPOV, the natural follow-up from this meeting would be to organize a series of similar national events for the countries which had shown interest in introducing plant variety protection. UPOV, for example, could arrange advisory missions to the said countries and organize national meetings and assist with lectures.

<u>Dr. Luhanga</u> (Malawi) said that help would be needed with the drafting and implementing of an act for plant variety protection as early as 1996. Some SADC countries, e.g. South Africa and Zimbabwe could, in his opinion, do a lot towards assisting and facilitating some of the tests they wanted to implement. From an immediate and practical standpoint, Malawi asked UPOV for examples of Test Guidelines for help in testing of varieties. He concluded by saying that he wished to see the use of improved seed by farmers in the future.

<u>Dr. Muliokela</u> responded that it was important to continue to exchange ideas. Zambia was content with UPOV's offer to provide leadership in the areas addressed. He said that Zambia already had a good research program for its region and they had a good relationship with the Netherlands. He hoped that future cooperation might help to strengthen their position for carrying out DUS tests on, for example, cassava, sweet potatoes, etc. He remarked that it was important to learn from developed systems and that nationally there was a great need for a workshop to sensitize breeders and certain policy makers to the needs of the industry. He wanted to further clarify the issue of small farmers and farmer's rights as well as to have further discussions on the framework of a system in the region.

Tanzania submitted a draft law for comment by UPOV

<u>Mr. Greengrass</u> confirmed that if in the future any of the other participating countries reached the stage of thinking about legislation, UPOV would be willing to help. He emphasized that the UPOV Office was always open for any information, advice and assistance.

CLOSING ADDRESS

by

Dr. David P. Keetch, Director, Directorate Plant and Quality Control, National Department of Agriculture, Pretoria, South Africa

On behalf of the South African Organizing Committee of Mr. A.J. Cronje, Mr. M. Joubert, Mr. V. Slater, Mrs. E. de Bruyn, Mrs. A Labuschagne and Mrs. L. Swanepoel, I thank you all for coming to South Africa to attend this Seminar on Plant Variety Protection.

I would like to extend a special word of thanks to Mr. Barry Greengrass for the manner in which he carefully and patiently explained the various aspects of plant protection to us. I know that he has explained many of these issues on various occasions at UPOV headquarters in Geneva, but he has done so again during this Seminar in order to draw to our attention the matters of greatest importance.

I would also like to thank those who have shared their experiences with us, in particular, the invited speakers from South Africa, Sweden, the United Kingdom and Zimbabwe. I think that from their talks, the discussion they stimulated and the keen participation of delegates of SADC member States, we have a better understanding of plant variety protection and its implications. How this concept will be applied in future by SADC member States is a matter for each state to decide.

May I wish you all a pleasant and safe journey home. Thank you for being here and we look forward to welcoming you back to South Africa in the near future.

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