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EXPERIENCES IN PLANT VARIETY PROTECTION  
UNDER THE UPOV CONVENTION

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## I. Introduction

1. The Consultative Committee of UPOV, at its sixty-second session in October 2001, decided to establish an Ad hoc Working Group (the “Working Group”) with the participation of selected new members from developing countries and countries in transition to a market economy to conduct a study on the impact of plant breeders’ rights on the basis of empirical data collected.

2. In my presentation I will introduce briefly the project of the UPOV study on the impact of plant breeders’ rights (see Part II), followed by some experiences in plant breeders’ rights in Kenya (see Part III), one of the countries participating in the UPOV study.

## II. Ad hoc Working Group to Study the Impact of Plant Breeders’ Rights

3. The purpose of the study is to conduct an empirical analysis of the impact of the introduction of a plant variety protection system on the basis of data collected in selected UPOV member States: Argentina, China, Kenya, Poland and the Republic of Korea. Profiles of these countries are summarized in Table 1 of the Annex.

4. The study should concentrate on the analysis of the impact of plant variety protection on developments in plant breeding. The Working Group agreed to collect data concerning the following parameters on the input side and output sides:

Paragraph (a) Measurable factors to indicate the inputs in the national breeding program:

- Parameter 1: Number of breeding entities (individuals, companies, governmental institutions, etc.);
- Parameter 2: Investment for plant breeding (for breeding facilities and/or for technical innovation).

Paragraph (b) Measurable factors to quantify the development of new varieties (outputs of the national breeding activities):

- Parameter 3 Number of released varieties;
- Parameter 4 Improvement of released varieties (in terms of increased yield, agronomic performance, quality, market chance of recently-released varieties, etc.).

### III. Experiences in Kenya in Plant Breeders' Rights

5. The Office to administer plant variety protection (PVP) in Kenya was founded in 1997 and has functioned under the Kenya Plant Health Inspection Service (KEPHIS) since 1998. Kenya acceded to the 1978 Act of the UPOV Convention on May 13, 1999, and KEPHIS has put in place the necessary structure for plant variety protection. The development in the number of applications for protection is given as follows:

<b>Years</b>	<b>Kenyan Applications</b>	<b>Foreign Applications</b>	<b>Notes</b>
1998	42	33	PVP System in operation
1999	16	45	Accession to UPOV
2000	24	45	
2001	164	33	
2002	11	27	

6. The principal aims of the establishment of PVP services were to:

- Provide incentives to breeders and thus encourage investment and efforts into plant breeding in Kenya;
- Allow Kenyans access to foreign varieties;
- Increase number and range of improved varieties available to farmers.

7. With these objectives in mind, a study was conducted to review the impact of the establishment of plant variety protection services in Kenya. Data was collected through interviews with breeders in public and private institutions and a questionnaire was developed to guide the discussions. Secondary data was also collected from records of Plant Breeders' Rights (PBR) applications submitted to the PVP Office. A total of fourteen (14) breeding institutions were visited (see the Table below).

#### **Profile of Institutions Covered**

<b>Institution</b>	<b>Number Visited</b>
Public Universities	2
Public Research Centres	5
Private Breeding Firms	4
Ornamental Firms	3
<b>Total</b>	<b>14</b>

#### *Changes in Investment*

8. The results revealed a general increase in investment in breeding activities since the establishment of PVP services amongst the visited institutions. Investment was greatest and more diverse in physical facilities and in technology (see Table 2 of the Annex). Most of these investments occurred in private institutions. Seven (7) institutions had invested on various forms of physical facilities. All the public institutions covered had experienced decreases in land acreage and financial allocations. In contrast, financial investment had increased in all private institutions within the same period. All the private institutions interviewed had acquired more land for research and seed multiplication.

9. A significant impact of the establishment of PVP services on both public and private breeders was seen in increased collaboration amongst local and foreign institutions. This involved capacity building, donor funding, germplasm exchange and commercialisation of foreign varieties in the country. This is because foreign breeders felt safe to introduce their materials and to invest in Kenya after the implementation of the plant variety protection system. Breeders have also extended partnerships with local farmers for on-farm testing of new varieties.

10. Institutions collaborating with local breeders are as follows:

(1) Donor organizations

- World Bank
- Rockefeller Foundation
- McKnights Foundation
- African Academy of Sciences
- Agricultural Research Fund

(2) International Research Institutions

- International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)
- International Institute of Tropical Agriculture (IITA)
- International Center for Tropical Agriculture (CIAT)
- International Center for Agricultural Research in the Dry Areas (ICARDA)
- International Maize and Wheat Improvement Center (CIMMYT)

(3) International Finance Cooperation

- AFRONET
- SIDA
- USAID

(4) Local Institutions

- Kenya Agricultural Research Institute
- Drought Monitoring Centre
- Kenya National Cleaner Production Centre

#### *Variety Introduction and Commercialization*

11. Of the 14 institutions visited, 10 had introduced new plant varieties into the market over the last five years, an achievement that they all reported to be higher than during preceding periods. In total 81 new varieties had been introduced by the institutions visited, most of which were still under NPT and distinctness, uniformity and stability (DUS) examinations (see the Table below).

**Varieties released by the 10 breeders Within the Last Five Years**

Plant	Number of Varieties Introduced
Maize	29
Wheat	6
Sugarcane	9
Tomato	2
Rose	21
Limonium	14
Total	81

12. Of these, 56 were bred locally, 17 were bred abroad while 8 were bred both locally and abroad through collaborations. Maize had the largest number of new varieties as well as diversity in quality improvement (see Table below). Maize is a staple food crop for 80% of Kenyans.

<b>Improved Factors in New Maize Varieties</b>	
<b>Parameter</b>	<b>Number of Breeders</b>
<b>1. Yield</b>	8
<b>2. Pest and diseases</b>	
Maize streak virus (MSV)	3
Smut	2
Grey leaf spot (GLS)	1
Mildew	1
Maize stalk borer	1
Blight	1
Striga tolerance	2
<b>3. Nutritional qualities</b>	
High protein content	3
Better cooking quality	2
<b>4. Abiotic stresses</b>	
Drought tolerance in maize	6
Frost tolerance in maize	3
Tolerance to low soil N fertility	2
Tolerance to soil acidity	2
Lodging resistance	1
<b>5. Early maturity</b>	5
<b>6. Bare tips</b>	1

13. Besides the factors listed in the Table above, one maize breeder focuses on developing varieties that can do well in both low and high potential ecozones. The same breeder targets low input farming and emphasizes on the exploitable potential (as opposed to maximum potential) of a variety that suits small-scale farmers' input conditions. Another maize breeder is preparing to introduce an early maturing variety Open Pollinated Varieties (OPV) for the

high altitudes that can be cultivated twice in a year. Improved parameters in the new sugarcane varieties included tolerance to heavy clays, high sucrose content and low fiber content. For wheat, the new varieties had improved resistance to yellow rust and stem rust. Longer shelf life was more important for the new tomato and flower varieties. The performance of the new varieties in the domestic market was reported to be better than previous varieties by eight breeders, whereas two had not explored this market. In contrast, only two breeders offered their new varieties in foreign markets and in which they reported better performance.

#### *Applications for Plant Breeders' Rights*

14. In the five years of existence of PVP Service in Kenya, a total of 578 PBR applications have been received. Local (Kenyan) breeders submitted 268 (46.4%) of the total PBR applications while 310 (53.6%) were of foreign origin (Table below). Public institutions presented 137 (51.1%) of the local applications whereas 67 (25%) were from private institutions. Private and public breeders jointly submitted 64 (23.9%) applications. No title of protection has, however, been granted and the applications are still being processed. The following steps are currently being undertaken in processing the applications:

- Issuing official gazette notices of the applications
- Receiving representations of objections on gazetted applications
- Testing for the DUS of the candidate varieties.
- Acquisition of test reports from authorities in other UPOV member states on varieties for which testing has been found not necessary in Kenya.

<b>Distribution of Plant Breeder's Rights Applications by Country</b>	
<b>Country</b>	<b>Number of applications</b>
Belgium	1
Ecuador	2
France	59
Germany	89
India	1
Israel	4
Italy	7
Japan	5
Kenya	268
Netherlands	129
New Zealand	2
South Africa	3
Spain	1
United States	7

*Influence of Plant Variety Protection on Breeding, Release and Commercialization of Varieties*

15. Of the 14 institutions visited, 2 claimed that the establishment of the PVP in Kenya has not influenced their activities in any way. The others, however, stated the following influences:

- 1) The breeding industry is now harmonized through enhanced description of varieties and, therefore, proper identification that has in turn promoted security in ownership and encouraged breeders;
- 2) Breeders now take deliberate steps to register and protect their varieties and there is generally increased interest in commercialized breeding;
- 3) There is enhanced introduction of and access to foreign varieties because of security in ownership created by the implementation of PVP. This has led to an increase in number of foreign varieties introduced into Kenya and enhanced collaboration amongst local and foreign breeders;
- 4) There is increased competition in the market from both local and foreign varieties, resulting in a strong focus on quality aspects of new materials;
- 5) Farmers are now growing new crops i.e. increased range of crops available to the farmers.

*Summary*

16. The evidence assembled from the review suggests that the implementation of plant variety protection in Kenya has stimulated interest in commercial breeding especially in the private sector. The greatest beneficiary has been the horticulture industry. This has been accompanied by a large increase in the number of foreign ornamental varieties introduced into Kenya for commercialization. The study also highlights an increased emphasis on investment in facilities and acquisition of modern technology for the purposes of breeding high quality varieties to compete in the markets. It is, therefore, evident that local farmers have access to a wider diversity of crop varieties. The impact of plant variety protection on farmers did not, however, form part of this review. Most local breeders are interested in agricultural crops, with maize being the main attraction. Activities in public breeding institutions are decidedly on the decline and the implications of this trend may require investigation. It is indicative that plant variety protection significantly influenced international collaboration and partnership. This is observed mainly in research and commercialization of foreign-bred varieties in Kenya.

Acknowledgement

The report on the Kenyan experiences is based mostly on “Assessment of Impact of Plant Breeders’ Rights Service in Kenya” prepared by Mr. M. Gunga, and the staff of the Plant Variety Protection Office of Kenya.

[Annex follows]

Table 1: Profiles of the participating countries

Country	Argentina	China	Kenya	Rep. of Korea	Poland
Region	South America	Asia	Africa	Asia	Europe
Surface (thousand sq. km, 2001)	2,780	9,598	580	99	323
Population (millions, 2001)	37	1,272	31	47	39
Population density (per sq. km, 2001)	14	136	54	480	127
GNI (billion US\$, 2001)	260.3	1,131.2	10.7	447.6	163.6
GNI per capita (US\$, 2001)	6,940	890	350	9,400	4,230
Rural Population (% of total, 2001)	12	63	66	18	37
Agriculture % of GDP (2001)	4.8%	15.2%	19.0%	4.4%	3.6%
Agriculture annual growth (2001)	1.0%	2.8 %	1.2%	1.4%	1.5%
Land area (thousand sq. km, 2000)	2,737	9,327	569	99	304
Land use (% of land area, 2000)					
--Arable land	9.1	13.3	7.0	17.4	46.0
--Permanent cropland	0.8	1.2	0.9	2.0	1.1
--other	90.1	85.5	92.1	80.6	52.9
Establishment of PVP	1991	1997	1998	1997	1987
UPOV membership (since)	December 25, 1994 (1978 Act)	April 23, 1999 (1978Act)	May 13, 1999 (1978 Act)	January 7, 2002 (1991 Act)	August 15, 2003 (1991 Act)
Number of genera and species eligible for protection	All genera and species	30 genera and species		113 genera and species	All genera and species



**Table 2: Investment in Plant Breeding and Variety Introduction and Commercialization in the Last Five Years in Kenya**

Investment	No. of Institutions	Investment	No. of Institutions
1. Physical facilities		4. Land	
Laboratory	6	Increased by:	
Seed processing equipments	3	0-5 ha	1
Irrigation facility	3	5-10 ha	2
Stores	3	10-20 ha	1
Photoperiod house	1	20-50 ha	1
Power supply	1	Over 50 ha	2
Grafting facility	1	Decreased	5
Glass house	1	No change	2
None	1	5. Personnel	
2. Technology		Increased:	
Information technology	4	Professional	8
Molecular/DNA mapping, electrophoresis	4	Technical	8
Biotechnology	4	Decreased	3
Photoperiodism	1	No change	3
Automation/computerisation	1	6. Collaboration	
3. Finance		With:	
Increased by:		Foreign institutions	4
Below 25%	1	International research institutions	4
25-50%	1	Farmers (outreach)	3
50-75%	3	Local institutions	3
75-100%	2	Donor institutions	6
Over 100%	2	7. Capacity Building	7
Decreased	5		

[End of Annex and of document]