



THE UNIVERSITY OF
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Assessing the economic implications of different models for implementing the requirement to protect plant varieties

A case study of Kenya

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**Impacts of the IPR Rules on Sustainable Development
'IPDEV'**

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As the author of the report, the views and ideas expressed here are my personal and reasoned views; no other person or institutions bears any responsibility for its contents. Comments are welcome and can be directed at the address below.

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LIST OF ABBREVIATIONS

BGH	Biosafety Green House
Bt	Bacillus thuringiensis
CBD	Convention of Biological Diversity
CIMMYT	International Maize and Wheat Improvement Center
CSGR	Centre for the Study of Globalisation and Regionalisation
DUS	Distinct, Uniform, and Stable
FAO	Food and Agriculture Organisation
GDP	Gross Domestic Product
GM	Genetically-Modified
GRAIN	Genetic Resources Action International
HCDA	Horticultural Crop Development Authority
IARC	International Agricultural Research Centre
IDS	Institute of Development Studies
IP	Intellectual Property
IPA	Industrial Property Act
IRMA	Insect Resistant Maize for Africa
ISNAR	International Service for National Agricultural Research
KARI	Kenya Agriculture Research Institute
KEPHIS	Kenya Plant Health Inspectorate Service
KFP	Kenya Fruit Processing
KIPI	Kenya Industrial Property Institute
KIPO	Kenyan Industrial Property Office
KSC	Kenya Seed Company
MNC	Multi-national Corporation
NARP	National Agricultural Research Programme
NBC	National Biosafety Committee
NCST	National Council for Science and Technology
NEMA	National Environmental Management Authority
NPT	Nonpharmacologic Treatment
OPV	Open-pollinated Varieties
PBAK	Plant Breeders' Association of Kenya
PBR	Plant Breeders' Right
PVP	Plant Variety Protection
TRIP	Trade-Related Aspects of Intellectual Property Rights
UNEP-GEF	United Nations Environment Programme-Global Environment Facility
UPOV	International Union for the Protection of New Varieties of Plants
USAID	United States Agency for International Development
WTO	World Trade Organization

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EXECUTIVE SUMMARY

I. INTRODUCTION

This is a study of the 'impacts' of implementing Article 27.3(b) of the TRIPs Agreement in Kenya. The study looks at how the international obligation is translated into the architecture of domestic law and analyses the economic changes that have occurred in plant breeding and the seed industry. Kenya is a useful choice as it has a 'relatively' long history with regulations in the area of plant varieties and seeds and it has been integrated into global supply chains in horticulture and floriculture. Agriculture has central significance in Kenya, not only does it support over 70% of the population but it is also a leading export earner. At the TRIPs Council, Kenya has regularly opposed the strengthening of existing obligations with respect to plant variety protection (in Article 27.3b). Consequently, studying the way in which this obligation to the TRIPs Agreement is domestically implemented can be a prism into how different domestic (and international) constituencies are handled.

II. BACKGROUND

Kenya is an agrarian-based economy with over 60% of the population classified as rural. Agriculture's share of the GDP is substantial, though it has fallen from nearly 40% in the 1970s to 25% in 2000. Yet, agriculture retains its importance not only as a source of livelihood (some 75% of the total labour force) but also as an export earner (about 70% of total exports). Significantly, it is small-holder agriculture that account for 75% of total agricultural production and 60% of the export-oriented horticulture and ornamental sector.

Maize is by far the leading crop of cultivation accounting for upwards of 30% of total cropped area. Production has stagnated with growth at 1.05% between 1990 and 2005. Yields have fallen from 1.76 tonnes per hectare in the 1990/94 period to 1.51 in 2000/04. Horticultural crops and flowers now account for short of 30% of the cropped area with vegetables alone accounting for 22%. Between 1974 and 2000, there has been a four-fold increase in their export value and exports are now valued at US\$167Mn. Coffee and tea together account for some 5-6% of the area. After tourism and tea, horticultural exports are the third largest export-earner; thus, displacing coffee from its position.

Seed industry

Till recently, seed production has been the province of the parastatal Kenya Seed Company (KSC). It was endowed with a legal monopoly to grow, process and sell certified maize seed. It also had exclusive rights to the multiplication and production of varieties bred by the Kenya Agriculture Research Institute (KARI).

As part of economic reform in the early 1990s, the seed sector was opened up to the private sector. Simultaneously, the exclusive right that KSC had to KARI varieties was terminated. Many seed companies have entered the market and presently there are 55 registered seed companies.

Of the total maize seed market, it is estimated that just over 45% is commercial maize seed. Despite the opening up of the seed market, KSC continues to retain its dominating position and accounts for 86% of the maize seed market (Table 1). Other crops where commercial seed sales occur are in the various fruits and vegetables that constitute the horticultural sector and certain oilseeds (e.g. sunflower). However, this is a relatively small market as over 70% of vegetable seed is imported.

Table 1: Maize Seed Data

Company	Seed Volume (1000Kgs)	Seed Sales (K£ Mn)	Market Share
Kenya Seed Company	25933.97	15.00	86.49%
Western Seed Company	666.27	0.60	3.46%
Faida Seed	0.00	0.55	3.17%
Farmchem	296.19	0.30	1.71%
Pannar	430.22	0.43	2.48%
Lagrotech	5.66	0.24	1.38%
	0.00		
Total	27576.66	17.34	

Note: (1) Seed volumes based on Kephis certified seeds (2003). (2) Seed sales are estimated figures.

Source: Ministry of Agriculture (2004)

Plant Breeding

Plant breeding is largely a public sector activity that is centrally coordinated by KARI and implemented through a range of domestic and international public sector institutions that include the Kenya university system, the International Agricultural Research Centres (IARCs) and a host of commodity boards. KARI's research expenditures have increased from K£40Mn in 1990/91 to K£74Mn in 1997/98. There has been an increase in the share from the public exchequer (now, 52%) so as to reduce the heavy reliance on donor funding as that tends to be project driven. Yet, there has been a secular decrease in research intensity which has fallen from 2.01 in 1991/92 to 1.05 in 1997/98.

Breeding activities in maize can be analysed through the varieties released. Between 1964 and 2003 there were over 80 varieties released of which 86% were released in recent years (1994/2003) and are heavily oriented towards hybrids. Only 11 varieties were open-pollinated varieties.

III. OVERVIEW OF REGULATIONS AND LAWS

Article 27.3(b) is a rare instance of intra-Quad differences, which in this case reflects the exclusion of plant varieties from patents as provisioned in the *European Patent Convention*. Consequently, the obligation allows for different legal practices and the space for imaginative law-making. Kenya has led the Africa Group at the TRIPs Council in advocating a 'no patents on life' position. Hence, the curiosity of how this Geneva rhetoric matches up with domestic law-making. Unfortunately, none of the Geneva rhetoric has filtered into the relevant domestic legislation. Moreover, the decision to accede to the 1978 Act of the *International Union for the Protection of New Varieties of Plants* (UPOV) – Kenya acceded in April 1999 – has constrained the space for legal imagination. In particular, a strong case for a cognitive lock-in to the architecture of laws established in Europe.

The *Seeds and Plant Varieties Act, 1972* provides the legal framework for plants and seeds. Provisions for PBRs were enacted through the *Seeds and Plant Varieties (Plant Breeder's Rights) Regulations, 1994* and are administered by the Plant Variety Rights Office at the Kenya Plant Health Inspectorate Service (KEPHIS). The Act establishes regulatory framework for transactions in seeds; thus introducing provisions for the registration of seed growers and seed merchants; creating an Index of Names of Plant Varieties; and rules concerning the selling of certified and tested seeds. The seed testing and certification system is to be administered by a *Seed Regulation Committee* (the Regulation, Section 5, passim). Part VI of the Act makes provisions for a *Seeds and Plants Tribunal*. While the Committee has rarely been convened, the Tribunal was only established in September 2006.

Within Kephis is the Plant Breeders' Rights Office that administers the PBR system. In 1997, the first applications were accepted and the first grants were issued in 2003. In 1996, UPOV reviewed Kenya's law for conformity and placed accession contingent on the execution of three changes. One of these required the deletion of a test for agroecological value as part of the tests for distinctness, uniformity and stability that collectively formed the conditions for grant of protection. These amendments were made; thus, Kenya's law is very similar to the UPOV template in key features like the conditions for grant, the scope and duration of protection, exemptions from the right and provisions for stronger rights. Like in the 1978 Act of UPOV, there is no explicit exemption for farmer seed saving/exchanging. The Act in Section 20(5)(a) says that 'the sale of reproductive material of a protected variety does not imply that the breeder authorises the purchaser to produce the reproductive material that was sold to him'. However, a farmer is prohibited from selling seeds because of the requirement to obtain seed certificates.

Kenya's first national patent law was passed only in 1989: the *Industrial Property Act of 1989*. On account of obligations arising out of the TRIPs Agreement, the *Industrial Property Act, 2001* was passed. Section 26 follows a well-established routine of attempting to demarcate and differentiate juridical space that would map onto biological space in terms of 'essentially biological' and 'microbiological'. This route was pioneered in the *Strasbourg Convention* and it continues in the *European Patent Convention* and most recently in the *Trade-Related Intellectual Property Rights Agreement*. Section 26(a) states that non-patentable inventions include "plant varieties as provided for in the Seeds and Plant Varieties Act, but not parts thereof or products of biotechnological processes". This is found to be legally ambiguous as it could be argued that plant varieties not provided for can be patentable subject matter.

Overall, the legal framework is an import of the European system and demonstrates the remarkable distance between *Geneva-rhetoric* and domestic reality.

IV. THE IMPACTS OF PBRs

The economic literature on PBRs is not as theoretically sophisticated as the literature on patents; instead it tends to be empirical and case study based. With the first applications received in 1997 and grants issued in 2003 there is very little data for analysis. Additionally, the data collected was not sufficiently disaggregated. Consequently, the research seeks to map out emergent trends. In the few years of operation there have been a sizeable number of applications (Table 2). This, in a

limited sense, is confirmation of confidence in the system amongst potential right-holders. Two emergent trends are noticeable: (a) resident and non-resident distribution and (b) the crop focus. While Kenyans collectively account for the largest share of applications (52%) there are leading shares held by applicants from the Netherlands (25%), Germany (16%) and Italy (10%).

Table 2: Kenya PBR Activity, 1997-2004

Year	Applications			Grants		
	Residents	Non-residents	Total	Residents	Non-residents	Total
1997	11	128	139	0	0	0
1998	42	33	75	0	0	0
1999	16	45	61	0	0	0
2000	24	45	69	0	0	0
2001	164	33	197	0	0	0
2002	11	27	38	0	0	0
2003	7	25	32	32	77	109
2004	16	45	61	0	41	41
Total	291	381	672	32	118	150
	43.30%	56.70%		21.33%	78.67%	

(a) Five grants ceased to be in force; thus total grants at the end of the year would be 36

Source: Kephis (various years), *Annual Report*, supplemented by UPOV (2005a), *Plant Variety Protection Statistics*, C/39/7.

The crop-wise distribution by nationality of applicant is one way to assess this evidence (Table 3). Even a cursory look at the table reveals a striking socio-technological division of labour between nationals and non-nationals:

- PBRs applications by residents are exclusively in cereals, industrial crops, oil crops and pulses
- Applications for PBRs by non-resident are exclusively in vegetables and ornamentals

Table 3 also shows the large share of applications in ornamentals (43%), in particular roses (37%). This corresponds with the growth of the cut-flower industry in Kenya that has also made it the largest exporter of cut-flowers to Europe. However, the particular role and impact of IPRs in this transformation remains unclear. Studying the phenomenal growth of the fresh fruit and vegetables sector, analysts have identified a number of drivers: geography and climate, demand and infrastructural spin-offs from tourism industry, effective and flexible private sector entrepreneurs, and stable, supportive policy environment. Notable in absence is any reference to Kenya's intellectual property policy or a reference to the agricultural research climate. Though PBRs have been applied for, it is clear that the industry grew with a system of informal self-regulation and has developed effective surveillance of the supply chain.

Table 3: Crop-Wise Distribution of Applications, 1997-2004

	Residents	Non-residents	Total	%age Share
Cereals				
Maize	55	0	55	8.18%
Wheat	30	0	30	4.46%
Sorghum	7	0	7	1.04%
Barley	7	0	7	1.04%
Industrial Crops				
Tea	33	0	33	4.91%
Pyrethrum	23	0	23	3.42%
Macadamia Nut	11	0	11	1.64%
Sugarcane	6	0	6	0.89%
Oils				
Rapeseed	0	14	14	2.08%
Sunflower	10	0	10	1.49%
Soybean	7	0	7	1.04%
Pulses				
Dry Beans	13	0	13	1.93%
Peas	0	7	7	1.04%
Pasture crops	10	0	10	1.49%
Vegetables				
French Bean	0	14	14	2.08%
Potato	4	0	4	0.60%
Cassava	2	0	2	0.30%
Ornamentals				
Rose	0	247	247	36.76%
Alstroemeria	0	28	28	4.17%
Limonium	6	8	14	2.08%
Total Applications			672	100%

Source: Author's calculations from Kephis data

A final theme of analysis concerns the public sector. Here, a key issue relates to the protection of varieties bred by KARI and its licensing policy. At the time of research, KARI was will debating these questions. However, strong indications of a move to use PBRs as a revenue generating exist in that the exclusive license to KSC has been terminated and applications for protection lodged. Projections of a royalty stream that contribute 8% of the operating income have been made. Caution must be sounded on this option and the projections. Effective use of PBRs requires significant investments in enforcing rights and marketing the same which may prove to be a drain on public resources. Concern about the impact of this policy on the competitive structure of the seed industry remains. Kenya has a relatively high seed-grain price ratio (4.5, compared to 1.7 in Zimbabwe) and with profits at 10-20% the market has an oligopoly structure. KARI's license policy could further aggravate this situation by hindering the entry and participation of new seed firms.

Finally, it remains to be seen whether the introduction of plant breeders' rights will actually respond to the productivity crisis in maize. Equally, is the issue of diffusion of technology in either the horticultural sector or in novel biotechnology areas.

1 INTRODUCTION

This is a study that focuses on the 'impacts' of implementing Article 27.3(b) of the Trade-Related Intellectual Property Rights Agreement (TRIPs Agreement) in Kenya. Kenya presents a useful site for a case study on plant variety protection for a variety of reasons. To begin, amongst countries in the Global South, it has a 'relatively' long history with seed market regulations and intellectual property rights. While the primary legislation was passed in 1972, the provisions concerning plant breeder's rights were made operational only in the late 1990s. Though this makes robust economic analysis difficult, it is a relatively early passage of law in the Global South. With the passage of this legislation Kenya also became a member of International Union for the Protection of New Varieties of Plants (UPOV), signing up to the 1978 Act. On the other hand, at the TRIPs Council, Kenya has been a strong advocate in opposing the strengthening of obligations with respect to plant variety protection (in Article 27.3(b), TRIPs). For example, not only has it opposed the granting of patents in micro-organisms it has argued for increased integration into TRIPs of norms and principles of the Food and Agriculture Organisation's (FAO) International Undertaking on Plant Genetic Resources for Food and Agriculture and the Convention of Biological Diversity (CBD) (WTO, 1999b). Kenya has 'successfully' integrated into global supply chains in horticulture and floriculture, both sectors of great national economic significance. This 'success' is often, as the report acknowledges and discusses, presented as a validation for introducing intellectual property rights in plant material¹. These sectors, in general, and agriculture, specifically, are centrally significant for Kenya as reflected in the sheer proportion of the population depending on it for their livelihood. Then, there is the

¹ By way of example, see UPOV (2005b).

production and revenue generation from agriculture. These different factors place varying pressures on the government as it implements an obligation to a multilateral institution. There is no *a priori* reason to assume that these pressures are either consistent or overlapping. Consequently, studying the way in which this obligation to the TRIPs Agreement is domestically implemented can be a prism into how different domestic (and international) constituencies are handled

The report begins with an overview of the state of the economy drawing particular attention to agriculture and the main crops of cultivation and trade. This overview also provides information about the state of the seed industry and plant breeding. This is followed by an overview of the national legislative framework in the area of plant material where particular attention is devoted to plant breeder's rights. Other complementary regulations, such as the Industrial Property Act (IPA) and seed certification system are also reviewed. Section 4 presents the main data analysis concerning the use, operation and 'impact' of plant breeder's rights. Section 5 provides a conclusion.

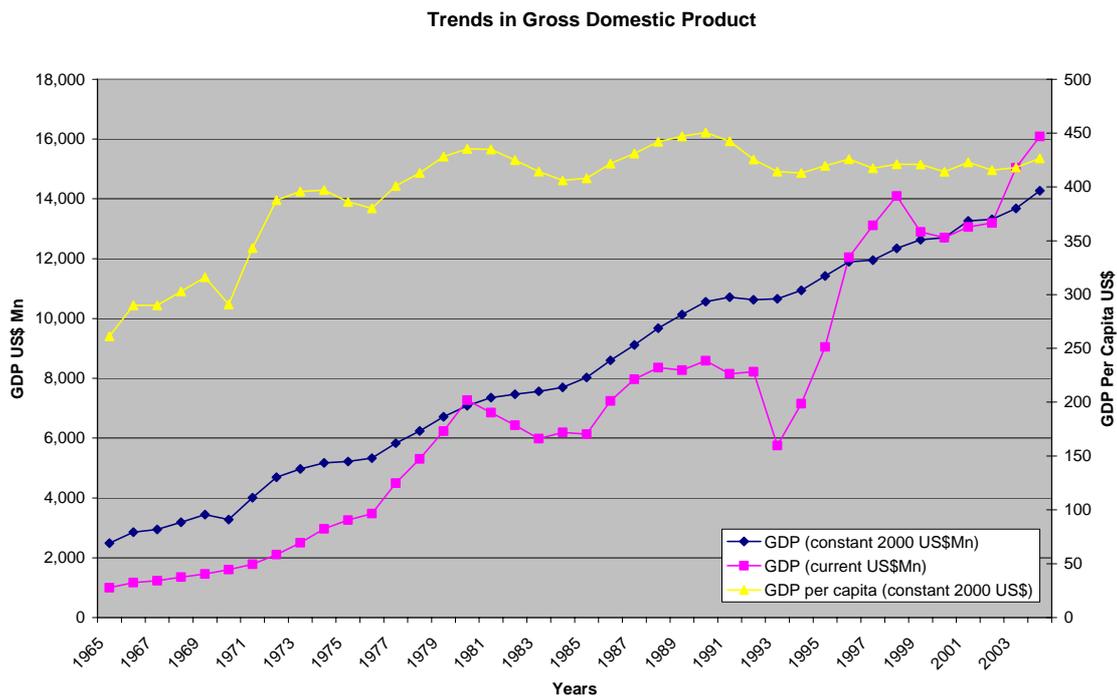
2 BACKGROUND

2.1 Economic Conditions

Kenya is an agrarian-based economy. An estimated 60% of the population is rural (19.9Mn, 2004). This is a substantial decrease from 1990 when 75% of the population (17.6Mn) was estimated to be rural. Other indicators of this transformation include the fall in agriculture's share of GDP from nearly 40% in the 1970s to 25% in 2000. Yet, as will be documented below, agriculture retains its importance. For example, it still accounts for some 75% of the total labour force and about 70% of total exports. Within this structural change, it is smallholder agriculture that characterises Kenya's agrarian

landscape. For example, smallholders account for 75% of total agricultural production. In the export-oriented horticulture and ornamental sector, smallholders are said to account for over 60% of the production (cf. Interview, Senior Policy Researcher)². The report returns to some of these aspects of Kenya’s agrarian economy at a later stage.

Figure 1



Kenya has displayed ‘steady’ economic growth in terms of GDP (cf. Figure 1). In constant US\$ (2000), GDP has increased from US\$5.2Bn in 1975 to US\$8.0Bn in 1985 and onwards to US\$12.7Bn in 2000³. While this is striking, the underlying growth has been highly cyclical. For example, annual rates of growth have had highs of 11.5%

² On the request of some respondents, anonymity of interviewees has been maintained throughout the report. A list of interviewees is available at the end of the report.

³ Comparable figures in constant Kenyan shillings are 403.6Bn, 620.9Bn, and 982.9Bn respectively.

(1972) and lows below 1% (1993/94). Over the last decade, 1995-2005, the rate of growth has been historically more modest and has remained within a band of 1.8% to 3.7%. However, with population growing at over 2% in the 1990s, much of this fluctuation, but secular growth in GDP, has been absorbed. Kenya's population has increased from 26.5Mn (1994) to 33.5Mn (2004); thus registering a 26% increase in a decade. Consequently, per capita incomes have stagnated and fallen. After a high of US\$450 in 1990, per capita incomes have fallen to US\$414 in 2000⁴. Per capita incomes have actually registered negative growth rates in recent years – and positive growth rates have been low.

Table 1

Sectoral Distribution			
	1975-84	1985-94	1995-2004
GDP by value added (%)			
Agriculture	35.22	30.85	30.22
Industry	19.61	18.60	17.07
Services	45.17	50.55	52.71
Employment (%)			
Agriculture	23.00	19.10	18.90
Industry	21.60	20.40	19.80
Services	55.40	60.50	61.30
<i>Note:</i> 1. Employment figures are for 1980, 1990, 1995 respectively. <i>Source:</i> Calculated from World Development Indicators			

In sectoral terms, Kenya's economy has undergone a structural change. Looking at the three main sectors – agriculture, industry, and services – it is possible to discern that agriculture has lost some of its dominance as a source of production (Table 1). For example, its share of GDP has fallen from 35% in 1975/84 to 30% in 1995/2004. In

⁴ These figures are in constant 2000 US\$. Comparable figures in constant Kenyan shillings (2000) are 34,856.29 and 32,025.95 respectively.

fact, the share of GDP on account of agriculture in 2004 was 28%, which is substantially lower than its peak value of 42% in 1977. Industries share has remained relatively stable with a minor decrease from 20% in the 1975/84 period to 17% in the 1995/2004 period. With industry neither leading the structural change nor capable of absorbing an expanding labour force, the service sector has filled in this gap. The share of GDP on account of services has increased from 45% to 53% in the same period – in 2004 the share was 56%. In terms of 'formal' employment also, services accounts for the largest share at 61% compared to industry at 20% and agriculture at 19%⁵.

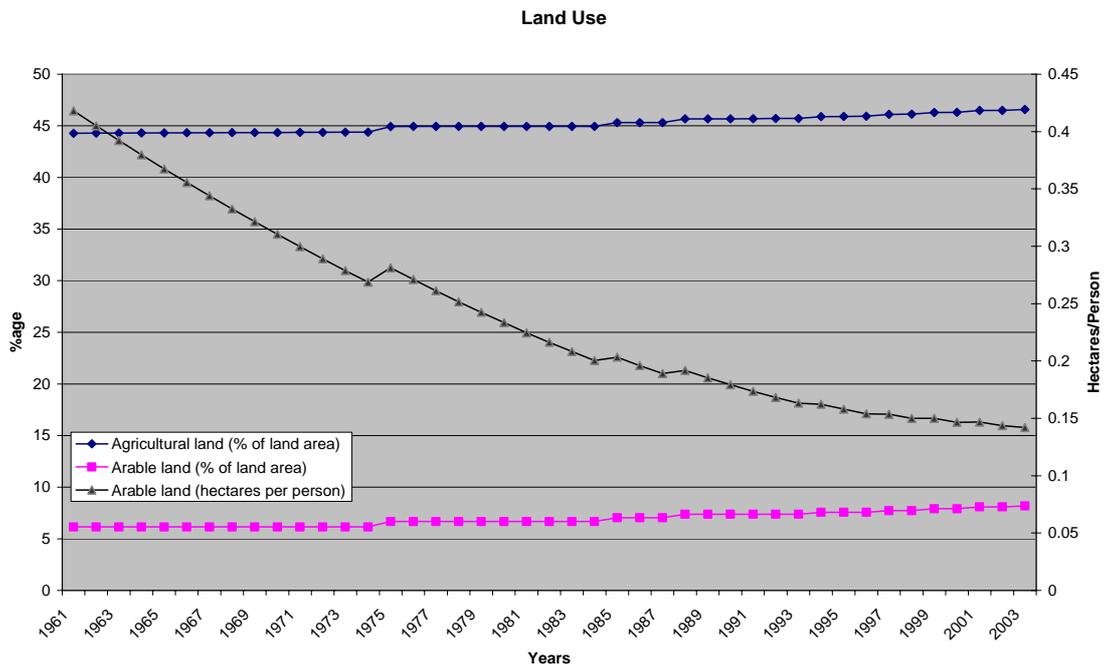
2.2 *The State of Agriculture*

The transformations noted above should not suggest that agriculture has lost its centrality to the Kenyan economy. It remains the dominant engine of growth as is made apparent in a host of statistics: the sector employs some 70% of the labour force, generates 60% of the foreign exchange, provides 75% of the raw materials for industry and 45% of governmental revenues (Odhiambo, 2003, p7). The same authors note that the sector has a 1.64 multiplier effect, suggesting a strong ripple effect across the economy.

In the last three decades or so the amount of land under agriculture has increased by about 1Mn hectares – giving an estimated 26.5Mn hectares in 2003 under agriculture (Figure 2).

⁵ Employment data is notoriously unreliable and limited. The data available from the World Development is restricted to a couple of years (i.e. 1980, 1990/91, 1995, and 1998/99). As this figure is of formal employment, there tends to be underreporting for agriculture. Others note that agriculture continues to account for upwards of 70% of the labour force (e.g. Odhiambo and Nyangito, 2003).

Figure 2



Nearly 90% of this increased area has been accounted for by arable land⁶. Land under permanent crops⁷ accounted for 10-12% of the increase. Despite this increase, there has been a significant fall in the hectare/person indicator, which fell from 0.28 hectares/person in the 1970s to 0.16 hectares/person in the 1990s (Figure 2).

Maize is by far the leading crop of cultivation accounting for more than 30% of total cultivation area under permanent and arable crops (Table 2).

⁶ Arable land is defined by the FAO as land under temporary crops, temporary meadows for mowing or for pasture, land under market or kitchen gardens, and land temporarily fallow.

⁷ The FAO defines permanent crops as crops that occupy the land for long periods and need not be replanted after each harvest (e.g. cocoa, coffee, rubber and tea).

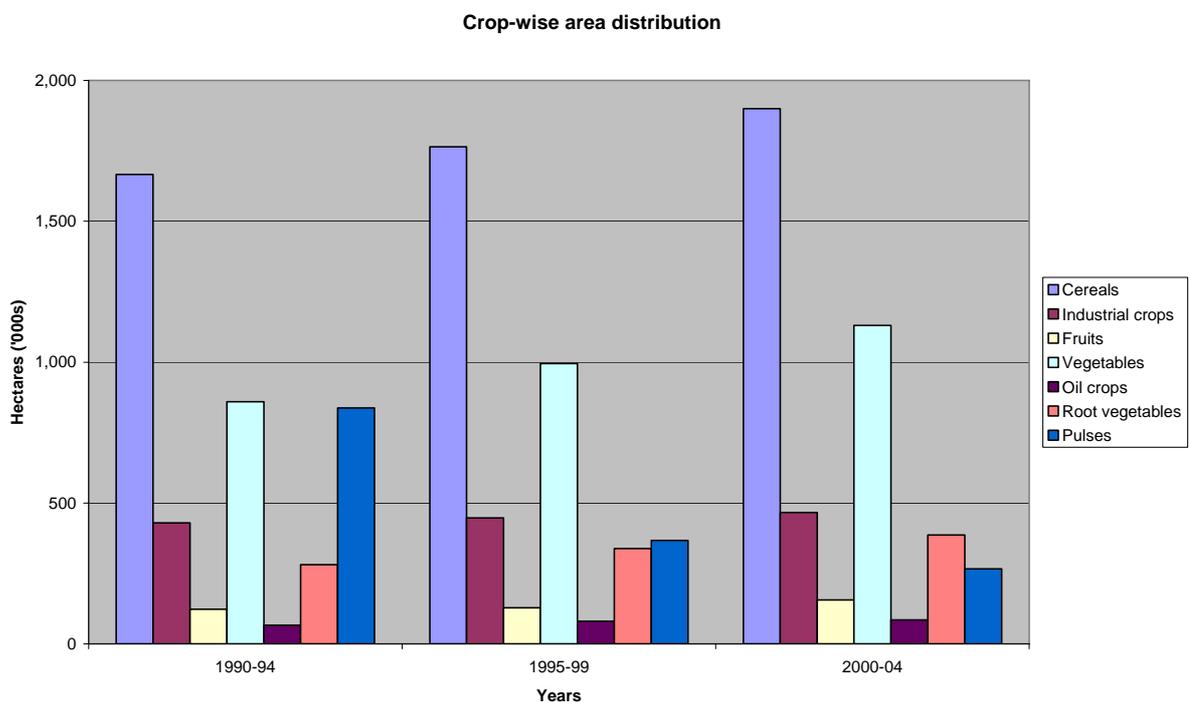
Table 2

Main Crops of Cultivation			
	<i>1990-94</i>	<i>1995-99</i>	<i>2000-04</i>
Maize	1388.10	1495.11	1613.60
	29.32%	30.38%	31.34%
Beans, dry	727.16	844.37	976.32
	15.36%	17.16%	18.96%
Coffee, green	155.84	172.66	169.40
	3.29%	3.51%	3.29%
Wheat	147.08	146.45	141.96
	3.11%	2.98%	2.76%
Sorghum	118.56	132.23	135.01
	2.50%	2.69%	2.62%
Tea and Maté	102.91	115.46	129.52
	2.17%	2.35%	2.52%
Potatoes	76.35	103.56	119.69
	1.61%	2.10%	2.32%
Millet	94.55	87.52	107.50
	2.00%	1.78%	2.09%
Cassava	51.10	58.26	66.42
	1.08%	1.18%	1.29%
Sugar Cane and Sugar crops, nec	49.06	54.22	52.74
	1.04%	1.10%	1.02%
Cottonseed	58.82	40.01	48.00
	1.24%	0.81%	0.93%
<p><u>Note:</u> (1) All data is average for the period and are 1000 hectares. (2) All percentages give the crop's share of total area under arable and permanent crops. <u>Source:</u> Estimated from FAOSTAT.</p>			

Being the staple, maize is synonymous with 'food' in Kenya. The other leading crops are industrial and export-revenue generating crops like coffee and tea which together account for some 5-6% of the area. Important food crops include wheat, sorghum, millet and cassava. A very significant and leading share is also accounted for by beans, which in the 2000/04 period covered 97.63Mn hectares or 19% of the area under arable and permanent crops. The crops in table 2 account for almost 70% of the area under cultivation. However, a transformed picture emerges when land use is examined by crop-type (e.g. cereals, industrial crops, fruits, vegetables, etc.) (Figure 3). The leading category is cereals, which collectively account for more than 35% of the area.

What is remarkable is the second category – vegetables. The area under vegetables has increased from 0.9Mn hectares in 1990/95 to 1.1Mn hectares in 2000/04 and its share has increased from 18% to 22%; thus, registering an increase in area of 30%. While the share of area under fruit cultivation is 3% (2000/04), there has been an increase of 25%.

Figure 3



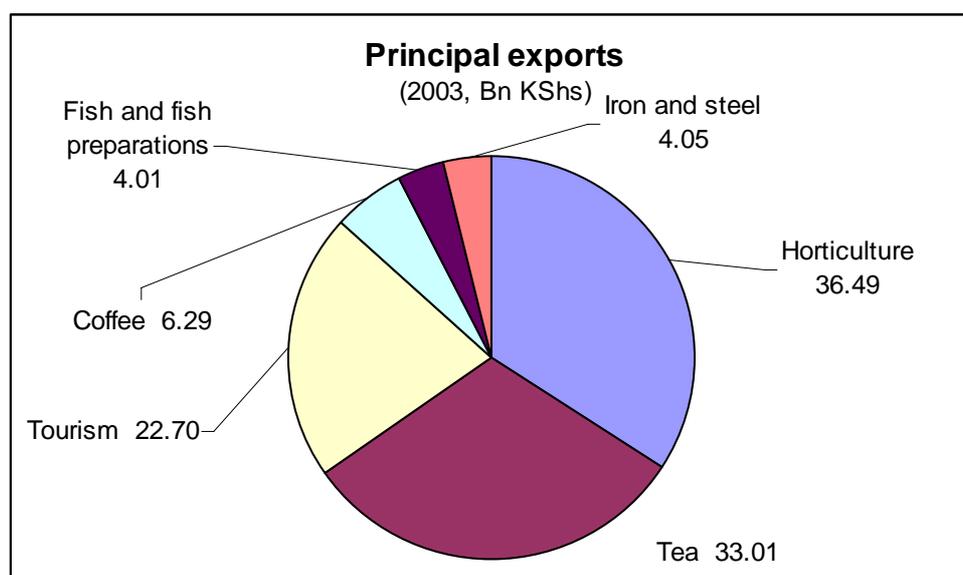
It is this remarkable growth of fruits and vegetables that has been recognised by a diverse set of commentators that are discussed in Section 4.2 below. This increase is equally pertinent in terms of the rather stable share of area under industrial crops (viz. tea and coffee) at 9%. As will be noticed later, the growth of the fruit and vegetable

sector is associated with a transformation of export revenue sources away from a primary reliance on industrial crops like tea and coffee.

In painting a relevant background picture it is useful to also review production and productivity data as that provides a context to the socioeconomic and agronomic problems confronting Kenya. Reviewing this data will also help contextualise evidence concerning new varieties and intellectual property rights. The amount of maize produced has registered some increases in the last fifteen years – such as peak years of 3.1Mn tonnes in 1994 and 2.8Mn tonnes in 2001. These years aside, period production has largely stagnated and registered an average rate of growth of only 1.05% (1990/2004). This productivity bind is easily seen in data on yield. Apart from relatively ‘good’ years where yield has been in excess of 2 tonnes per hectare (e.g. 1994), maize productivity in Kenya is poor and has diminished over the years. Yields have fallen from 1.76 tonnes per hectare in the 1990/94 period to 1.51 in 2000/04. What is disturbing is that domestic maize production falls short of domestic consumption, estimated at 3.1Mn tonnes (Ministry of Agriculture, 2004, p7). Policy attention is focussed on improving the adoption of “productivity enhancing technologies such as improved germplasm” (op cit). In the case of tea, there have been substantial increases in the amount produced. Thus, from about 200000 tonnes in the early 1990s the amount of tea produced has crossed 290000 tonnes in 2003/04; thus, registering an average growth of 3.75% between 1990 and 2004. Some of this increase can be attributed to yield increases. Data shows that tea yields have increased from 1.96 tonnes per hectare in 1990/94 to 2.19 in 1995/99 and 2.17 in 2000/04. The other important industrial crop is coffee, where, unfortunately the evidence is not promising. While coffee production averaged 74700 tonnes between 1990 and 2004, there has been a substantial reduction over the years with a negative growth rate of 2.04%. Thus,

in 1990/94 the amount of coffee produced averaged 86120 tonnes and this fell to 61400 tonnes in 2000/04. Changes in the total amount produced cannot be attributed to changing land-use patterns as the area under coffee has actually increased. Rather, it is a reflection of a productivity constraint as coffee yields have registered large declines, falling from 0.55 tonnes per hectare in 1990/94 to 0.36 in 2000/04.

Figure 4

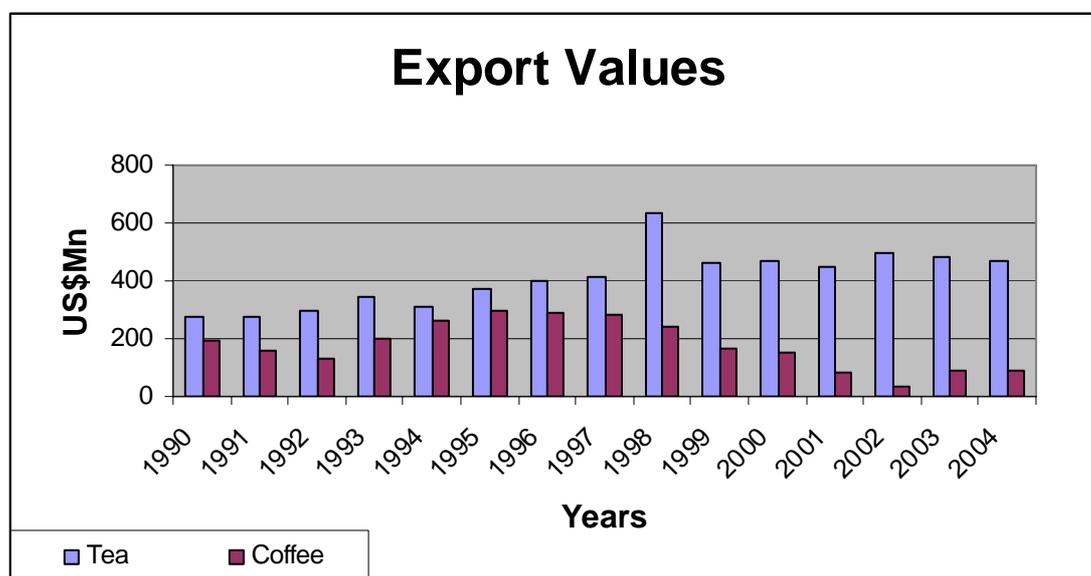


Another dimension to the significance of agriculture is its dominance as a source of export revenues (Figure 4). What is remarkable about Kenyan agricultural exports is the crop-wise transformation that has taken place. To state it simply: fruit and vegetable exports have emerged as a substantial source of export revenues (approx. between 10-15% of total agricultural exports). There has been a four-fold increase in their value in constant dollar terms between 1974 and 2000, when total exports were valued at US\$167Mn.

After tourism and tea, horticultural exports are the third largest export-earner; thus, displacing coffee. Data for 2003 (cf. Figure 4) indicates that horticulture has become

the leading export earner. The significant, though presently diminishing, presence of small-scale producers in these sectors adds an important socio-economic dimension to this transformation [Minot, 2004 #5]. As the dominant commodity crops – particularly coffee – have not been performing as well, this ‘spectacular’ performance of horticulture has been essential... As figure 5 shows, over the last fifteen years the value of coffee exports has decreased substantially. Though increasing through the early 1990s to US\$300Mn in 1995, the value of coffee exports has since decreased and in 2000/04 they averaged US\$90Mn only. The decline in coffee prices through the late 1990s and 2000 has been a contributory factor. On the other hand, the value of tea exports has recorded a steady growth in this period (cf. Figure 5). They have increased from about US\$300Mn in 1990/04 to US\$472Mn in 2000/04, having recorded a high of US\$634Mn in 1998.

Figure 5



2.3 *The Seed Industry*

'Seeds' are a critical input into agriculture and recognised as placing the upper limit to productivity gains (Cromwell, 1990; Jaffee and Srivastava, 1992). Technical change in agriculture occurs primarily through seeds in what is recognised as a form of embodied technical change (Godden, 1998). To explain, it is transformations achieved in the *software*⁸ of the seed by breeders and by working with allied and compatible inputs that productivity changes occur in agriculture. This distinction between transforming the *software* (plant breeding) and *hardware* production (seed production) is reflected in the industrial separation between the two. Seed certification regulations seek to ensure that the *software* changes introduced by the breeder are retained through *hardware* production and delivered to farmers.

Because of the significance of seed production many governments have historically tended to retain it within the public sector. The need to maintain a reliable supply of good quality seeds and ensure its wide distribution is important. Additionally, commentators note that the appropriability problems have kept the private sector away from plant breeding and seed production (Jaffee and Srivastava, 1998, 1999).

In Kenya, seed production has until very recently been the province of the parastatal Kenya Seed Company (KSC). The British set up the KSC during the colonial period in 1956, initially for the production of pasture seeds. In 1963, with funding from the USAID, it achieved significant success in producing hybrid maize. While it has operated as a quasi-private company, the government endowed it with a legal monopoly to grow,

⁸ See Lewontin and Berlan (1990) for the idea of distinguishing between *software* and *hardware* in terms of seeds.

process and sell certified maize seed. It also had exclusive rights to the multiplication and production of varieties bred by the Kenya Agriculture Research Institute (KARI)⁹. In recent years KSC has initiated its own breeding programmes, principally in hybrid maize.

As part of wider economic reform in the early 1990s and the eventual passage of the *Seeds and Plant Varieties (Plant Breeders' Rights) Regulation*, the seed sector also underwent significant policy changes and was opened up for increased private sector entry. A key element of this change was the termination of the exclusive rights that KSC had to KARI varieties in 1995 (Interview, Public Sector Seed Company). The new position is that KARI releases its varieties through a tendering process, which should also help KARI earn a 'better' price for its varieties (cf. section 2.4, below). KARI itself went on to establish the KARI Seeds Unit as a means to generate revenues from its varieties and other technologies. To regulate the seeds market, Kenya Plant Health Inspectorate Service (KEPHIS) was established in 1996 as an autonomous regulatory body¹⁰. Over the years, a number of foreign companies (Pannar from South Africa) have entered Kenya. A Ministry of Agriculture study notes that KEPHIS has registered 35 seed companies and 13 of them operate in maize (Ministry of Agriculture, 2004, pp8-9). A recent study notes that 46 seed companies have been registered (c. 2004; UPOV, 2005b, p55) whereas respondents suggest that the number is 55 (Interview, Public Sector Seed Company). Notable companies operating include Western Seed Company, Lagrotech, Pioneer, Pannar, Faida Seeds, Freshco, Monsanto, and SeedCo Company among others (Table 3).

⁹ The next section provides some background information on KARI.

¹⁰ As noted elsewhere, Kephis is also empowered to enforce the *Seed and Plant Varieties Act*.

Table 3

Maize Seed Data			
Company	Seed Volume (1000Kgs)	Seed Sales (K£ Mn)	Market Share
Kenya Seed Company	25933.97	15.00	86.49%
Western Seed Company	666.27	0.60	3.46%
Faida Seed	0.00	0.55	3.17%
Farmchem	296.19	0.30	1.71%
Pannar	430.22	0.43	2.48%
Lagrotech	5.66	0.24	1.38%
Total	27576.66	17.34	98.63%
<u>Note:</u> (1) Seed volumes based on Kephis certified seeds (2003). (2) Seed sales are estimated figures. <u>Source:</u> Ministry of Agriculture (2004)			

The main crop of the seed market is (hybrid) maize. Kenya was one of the first countries in sub-Saharan Africa to adopt hybrid maize (Louwaars et al., 2005, p61). Of the total maize seed market, it is estimated that between 45% and 54% is commercial maize seed with only a limited amount of open-pollinated maize varieties (OPVs) (op. cit; Interview, Executive, Biotechnology NGO). Thus, a sizeable share of the market is catered through 'informal' sources. For example, a farm-based survey found that 66% of seed use was certified hybrid seed, 20% landraces and traditional varieties, 12% a mix of recycled hybrids and open-pollinated varieties and the balance were open-pollinated seeds (Waiyaki et al., 2005). There are regional differences and variations in the seed sources for each crop. In the Machakos area, only 2% of cowpea and pigeon pea seeds are certified (Gordon, 2000).

These differences aside, it is generally recognised that Kenya demonstrates a high uptake of certified hybrid seeds in maize (Interview, Executive, Biotechnology NGO; Academic). This is certainly true; though, recent years have witnessed a substantial fall in the use of certified seeds: from 93% to 88% in the high-potential maize zone, 85% to 57% in the Western transitional zone and 91% to 57% in the Central Highlands

between 1997 and 2004 (Waiyaki et al., op. cit.). The falling uptake of certified seed is considered one of the factors accounting for the stagnating yield of maize.

Despite the opening up of the seed market, KSC continues to retain its dominating position and accounts for 86% of the maize seed market (Table 3). In 2003, KSC accounted for 94% of the total certified seed (Ministry of Agriculture, 2004, p11). A number of commentators express concern about the oligopoly structure of the maize seed market (Ndii and Byerlee, 2004; Waiyaki et al., 2005). For example, the exclusive licensing of KARI varieties to KSC has generated the unique structure of KSC's dominance and the emergent (but growing) presence of a few multi-national corporations (MNCs) (Ndii and Byerlee, 2004; cf. section 4). A recent study of the industry, noting that maize seed is overpriced in Kenya¹¹, that KSC can reduce its overheads and shorten distribution channels whilst also lowering its 20% profit margin (Waiyaki et al., 2005).

Other crops where commercial seed sales occur are in the various fruits and vegetables that constitute the horticultural sector and certain oilseeds (e.g. sunflower). KSC also has a presence in this segment of the seed market. This occurs through its 1979 purchase of a seed company specialising in vegetable and flower seeds. However, over 70% of vegetable seed is imported. A leading operator is Regina Seeds, a subsidiary of Seminis – the global leader in fruit and vegetable seeds.

¹¹ An alternative hypothesis would be that seed growers are underpaid.

2.4 *Plant Breeding*

Plant breeding – and agricultural research in general – is primarily a public sector activity in Kenya. A feature it shares with many countries in the Global South. While recent years have witnessed the entry of the private sector, the central and dominant player is KARI, which was established in 1979. While headquartered in Nairobi, it functions through a number of experiment stations across the country: Kitale, Kakamega, Embu, Mtwapa, Katumani, Muguga, Kibos and Kisii. KARI is supported and complemented by a range of other public sector institutions. This includes agricultural research conducted within the Kenya university system, the International Agricultural Research Centres (IARCs) and a host of commodity boards with research budgets¹².

Apart from its leading role in the breeding of new varieties of maize (hybrids as well as open-pollinated varieties), KARI has successfully developed varieties of beans, cowpeas, pigeon peas, sorghum, millet, wheat, barley, potatoes, sweet potatoes, and other tuber crops. It also has extensive programmes on livestock and biotechnology (often with partners, see below) and scientists and researchers working on socio-economic aspects of agriculture. In 1981, the National Council for Science and Technology (NCST) invited the International Service for National Agricultural Research (ISNAR) to review the agricultural research system (Mbabu et al., 2004). There were various recommendations that eventually led to the reorganisation of KARI (in 1989) and the launch of the National Agricultural Research Programme (in 1986). The reorganisation also coincides with the financial crisis of funding agricultural research –

¹² Kenya Forestry Research Institute for trees; Coffee Research Foundation for coffee; the Pyrethrum Board of Kenya; the Kenya Sugar Research Foundation and the Tea Research Foundation of Kenya.

a crisis that was experienced by National Agricultural Research Systems across the globe in the 1980s/90s. Between 1961 and 1991, agricultural research expenditures financed by the public exchequer grew at 4.3% per annum (Akroyd et al., 2004). As a share of 'agricultural GDP' (AgGDP), research expenditures peaked at 2% in 1991/92 and have subsequently fallen to 1% in 1997/98 (Akroyd et al., op cit.). Data on KARI finances reveals an interesting dynamic of changing funding sources (Table 4). Donor funding increased from K£16.7Mn in 1988/89 to peak at K£35.4Mn in 1992/93. Recognising the unsustainable and tied nature of some of these funds, the government has increased its outlays. Thus, a three-fold increase between 1988/89 to 1997/98 makes government funds the single largest institutional source at 52%. Despite this increase, the key variable – research expenditures as a share of AgGDP – has experienced a secular decrease since 1991/92.

Table 4

KARI Research Expenditures, K£Mn (Current Prices)									
Years	AgGDP	KARI Research Expenditures	Research Intensity (%)	Funding Source			Share in Research Expenditure (%)		
				GoK	Donors	Internal Revenues	GoK	Donors	Internal Revenues
1988-89	1902.7	27.6	1.44	10.2	16.7	0.7	37	61	2
1989-90	2088.4	36.5	1.74	10.7	25.0	0.8	29	69	2
1990-91	2235.5	40.5	1.81	11.8	27.9	0.8	29	69	2
1991-92	2337.7	47.0	2.01	14.5	31.8	0.7	31	68	1
1992-93	2681.9	52.0	1.94	15.2	35.4	1.4	29	68	3
1993-94	3583.1	56.0	1.56	21.9	32.9	1.2	39	59	2
1994-95	4344.0	64.6	1.49	28.2	35.4	1.0	44	55	1
1995-96	5428.8	70.3	1.29	32.2	35.2	2.9	46	50	4
1996-97	6223.0	70.9	1.14	33.4	31.7	5.8	47	45	8
1997-98	7006.0	73.6	1.05	38.5	32.1	3.0	52	44	4

Source: Akroyd et al. (2004)

Responding to this crisis, KARI has taken a number of steps and we draw attention to efforts at internal revenue generation. Coinciding with the regulatory changes, in particular the passage of the *Seed and Plant Varieties (Plant Breeders' Rights) Regulation, 1994* (cf. 3.2, below), KARI favourably considered royalty income from

licensing its plant varieties and germplasm. In fact, it commissioned a study from Deloitte and Touche Consulting¹³ who estimated a seeds' royalty income of K£60-80Mn¹⁴, which would contribute 8% of its operating income (Ndi and Byerlee, 2004). This, as will be noted later in section 4.3, has serious repercussions on the viability of new start-up seed companies; hence, the diversity of technology supplier and general competitiveness in the seed industry. In implementing this strategy, the KARI Seeds Unit was established in 1997 and became operational in December 1999 (KARI, 2004, p195). KARI's *Strategic Plan 2005-2015* (KARI, 2005, p29) identifies the focus of the Seeds Unit as a mix of generating revenues and promoting new technologies and thus it has signed license agreements to commercialise its varieties and remit royalties (cf. section 2.3 and 4.3).

Donor funding remains a significant part of KARI finances, approximately 45-50%. As this often tends to be project driven, some observers have raised concern about the re-orientation of public plant breeding in Kenya¹⁵. This dependence and directed orientation of research appears more transparent in biotechnology where donor funds are said to account for 67% of the resources (in 1996) – a share that was 75% in 1989 (Wafula and Falconi, 1998).

¹³ Deloitte and Touche Consulting, 1997, *KARI Revenue-Generating Strategic Review*, Overseas Development Administration contract reference: cntr 96 1193A. Final Report, Nairobi: KARI. Cited in Ndi and Byerlee (op. cit.).

¹⁴ It's very likely that Ndi & Byerlee (2004) have the estimates mixed up as a royalty income of K£60-80Mn would be more than their operating research expenditures in Table 4.

¹⁵ For that matter, the African Biotechnology Stakeholders Forum was set up on an initiative that involved, among others, CIMMYT, who were then interested in trialling an insect-resistant maize variety that was genetically modified.

In this respect, mention is made of two particular agricultural biotechnology projects, viz. striga-resistant maize (in collaboration with CIMMYT) and transgenic sweet potato (in collaboration with Monsanto, part funded by USAID). Odame et al. (2002) note the significance of focussing on sweet potato where low yields and loss due to pests and disease can account for 80% loss. However, despite favourable results from field trials, they remain sceptical of wide farmer adoption as the delivery system is not suitable and its complexity may not settle well with differing biophysical environments of the farming conditions. For some commentators the increasing pressure of donor driven research programmes has allowed wider presence of the private sector and suggests a corporatisation of the public sector (e.g. Kuyek, 2002). On the other hand, KARI indicates a selective prioritisation and identification to collaborative research (Interview, Public Sector Breeders). Moreover, the broad range of actors involved in the different projects might diffuse the potential influence of any single actor. Others less sceptical commentators actually seek to “debunk the myths of GM crops” in Africa (see de Groote et al., 2004)¹⁶.

In 1994 the Plant Breeders' Association of Kenya (PBAK) was established and officially registered two years later. PBAK plays an important role in representing the interests of the plant breeders. It also advises on a range of issues related to the protection, regulation and marketing of seeds. Despite lack of data, the opening of the seed market has generated some interest and investment in private sector plant breeding (cf. section 2.3). Here, a mix of classical plant breeding in some of the food crops exists with a nascent focus on biotechnology. Despite the increase in the number of

¹⁶ The research for this paper was provided by Syngenta Foundation for Sustainable Agriculture and includes a collaborating author from KARI.

registered seed companies, Waiyaki et al. (2005) indicate that there are about nine local seed companies in maize with most engaging in a mix of licensing germplasm from KARI (and IARCs) and conducting some in-house breeding. The MNC seed companies, as noted in section 2.3, import their certified seeds from South Africa, Zimbabwe or Malawi; thus, conducting limited breeding activities in Kenya. In the export crops (horticulture and floriculture) it is fair to say that most of the breeding activity takes place overseas. For that matter, in cut flowers only bulk selection seems to occur in Kenya (Interview, Ornamentals' Breeder).

3 THE LEGAL FRAMEWORK FOR PROTECTING PLANT MATERIAL

The national legal framework for PBRs is set out in the *Seeds and Plant Varieties Act*. While this Act was introduced in 1972 and came into force in 1975, the provisions for PBRs were only enacted in 1994 with the passage of the *Seeds and Plant Varieties (Plant Breeder's Rights) Regulations*. The system was operational a few years later with the establishment of the Plant Variety Rights Office in KEPHIS in 1997. Aside from this, there are other laws and regulations that allow for the intellectual property protection of plant genetic material, such as the *Industrial Property Act, 2001* which allows for the grant of patents on biotechnological inventions subject to certain exceptions (Section 3.4 below). Other regulatory measures include the laws concerning biosafety, environment, and seed certification, all of which are discussed below. The shape and relationship between these laws and regulations have been influenced by different factors that include the lobbying of actors located in the export-oriented horticulture and floriculture industries, public sector breeders and of farmer and civil society groups. Equally, the government (and relevant officials) have adopted particular, though not consistent, positions on the application of intellectual property rights in this area at multilateral and regional negotiating bodies. For example, as

discussed below, Kenya has advocated against the ‘patenting of life’ and supported integrating CBD measures with TRIPs at the WTO (cf. section 3.6). An examination of domestic law in this area provides insight into how different interests are negotiated and accommodated and how Geneva rhetoric is translated into practice.

This section reviews the different laws and regulations concerning plant varieties and ends with a commentary on this domestic architecture that draws inferences on the tensions between different interest groups and the government’s posturing at multilateral bodies.

3.1 *The Seeds and Plant Varieties Act, 1972*

The *Seed and Plant Varieties Act*¹⁷ (henceforth, the Act) was enacted in 1972 and came into force with the passage of the *Seeds and Plant Varieties Regulations (Seeds)*¹⁸ (henceforth, the Regulation) in 1975. Alongside South Africa¹⁹ and Zimbabwe²⁰, this is amongst the earliest legislations in the area of seeds and plant varieties in Africa. An important factor in initiating this policy was interest of actors located in the nascent horticultural industry in Kenya (Interview Academic; Ornamentals’ Breeder). Key techno-legal support for this legislation came from Britain; hence the astute observation that the law “closely resembles” UK’s *Plant Varieties and*

¹⁷ *Seeds and Plant Varieties Act 1972*, (Ch 326), 01/01/1975 (1991), UPOV Gazette No 94, 35 – 54.

¹⁸ *Seeds and Plant Varieties Regulations (Seeds)* (Ch. 326), 01/01/1975 (1991)

¹⁹ The *Plant Breeders’ Rights Act, No. 15 of 15 March 1976* entered into force on 1st November 1977. It was subsequently revised and amended in 1980 and 1986. South Africa became a member of UPOV in 1977 and is bound by UPOV’s 1991 Act.

²⁰ The *Plant Breeders’ Rights Act* was enacted in 1973 and entered into force in 1974. It is modelled on UPOV’s 1961 Act. In 1998, Zimbabwe initiated procedures for being a member of UPOV. This is presently still being negotiated (UPOV, 2006).

Seeds Act, 1964 (UPOV, 1996, paragraph 3). These laws follow and complement the establishment of the *Horticultural Crop Development Authority* (HCDA) in 1967. The Act and the Regulation are concerned with organising the seed market, as elaborated in its preambular statements, and, is aimed at “the grant of proprietary rights to persons breeding or discovering new varieties”²¹. An initial amendment in 1977 was followed by an amendment to the Act and the Regulation in 1991; the Act was again amended in 2002. The latter, primarily, was prompted by the review for conformity that UPOV conducted in 1996 when specific amendments and deletions were recommended to allow Kenya’s UPOV membership (UPOV, *ibid.*). The analysis here relates to the 2002 text.

Table 5

The Seed and Plant Varieties Act	
<i>Part I</i>	Preliminary information, i.e. definitions
<i>Part II</i>	Seed market regulations (e.g. Index of varieties, civil liabilities on seed sales, regulating sales of unindexed varieties)
<i>Part III</i>	Testing and certification of seeds
<i>Part IV</i>	Maintaining seed quality (e.g. control of imports of deleterious seeds, cross-pollination)
<i>Part V</i>	Plant breeder’s rights (e.g. conditions for grant of rights, scope and duration of protection, responsibilities of breeder)
<i>Part VI</i>	The Seeds and Plants Tribunal
<i>Part VII</i>	General and administrative matters

The Seed Market

An essential aspect of the Act is to establish regulatory framework for transactions in seeds. Thus, in the Regulation there are provisions for the registration of seed growers (section 8) and seed merchants (section 9) who seek to undertake transactions in

²¹ This statement from the Act is one of many examples of the close correspondence with the 1978 Act of UPOV. The close correspondence is elaborated and discussed below.

certified seeds. With a primary requirement for registration, transactions in seeds are only possible after registration. Thus, for example, section 9(1) of the Regulation sets out that “[E]very person who by way of trade or business produces, purchases or otherwise acquires, sells, exposes, keeps, stores or advertises for sale any seeds purported to be government tested and certified shall apply to the secretary, Seed Regulation Committee for registration as a seed merchant”. Section 7 of the Act sets out provisions for an Index of Names of Plant Varieties. For different classes of plant varieties there will be an index and it is required that these indexed names be used with the sale of those varieties. Rather similar to the National Listing Schemes in Europe, inclusion in the index requires a mix of an agroecological factors and establishing distinctness, uniformity and stability (cf. Section 8, the Act). Thus, section 8(4)(a) requires the variety to exceed “existing one in *some* aspect” of agroecological value (emphasis added). While this may seem vague, it is generally understood in practice to be a test for agronomic values (e.g. yields, disease resistance, etc.) (Interview, Senior Regulator). In addition, the variety is required to satisfy tests establishing that its “essential characteristics” are “sufficiently distinguishable” and “sufficiently varietal pure and stable” (Section 8(4)(b) and (c), the Act). The adjective ‘essential’ is understood to raise the requirement and ensure that trivial characteristics are not used as a means to differentiate new varieties from those already on the Index (Interview, op. cit). A final aspect of the provisions regarding the seed market concern the selling of certified and tested seeds. To begin, there are prohibitions, with some exceptions (see the Act, Section 8(2)); to sell seed of an un-indexed variety that belong to a class of indexed varieties under a different name is an offence (the Act, Section 8(1)). However, it is the requirement for commercial sale of seeds to be of only those certified and tested for quality that sets out the foundations for a certified seed market (cf. the Regulation, section 17). Like in many other countries that have introduced a

regulatory framework for certified and tested seed market, these provisions are backed with civil liabilities. For example, it is a civil offence to provide a false statutory statement concerning varietal qualities (the Act, Sections 3(c) and 4).

Complementing the above are provisions for testing and certifying of seeds (the Act, Part III). Here through Sections 11 to 14, the Act envisions the establishment of official testing centres, the issuing of certificates and the use of test results as evidence in legal proceedings. In Part IV, the Act deals with issues related to seed quality and has provisions concerning the seed imports and the maintenance of varietal purity of seeds. Under Section 15, the Minister has power to restrict the importation of seeds that will or may cause deterioration of domestic plants by cross-pollination or may be unsuitable for use in Kenya. Maintaining varietal purity is important in ensuring that improvements achieved by breeders are retained in and transferred via seeds to the farmer. Thus, the Act in Section 16 makes provisions for this.

Administration and Tribunal

The seed testing and certification system is to be administered by a *Seed Regulation Committee* (the Regulation, Section 5, passim). The Committee is to be constituted by a broad and diverse membership that includes, amongst others, the Director of KARI, the General Manager of HCDA, the Chief Executive of the Kenya National Farmers' Union, and the Director of Agriculture (who acts as Chairman). The Committee has a wide remit to develop seed policy, establish certification standards, and determine the fee structure. Apparently, the Committee has met only twice ever since its inception. This suggests that it has remained a hollow paper tiger and that administration is effectively in the hands of Kephis.

Part VI of the Act makes provisions for a *Seeds and Plants Tribunal*. Any person aggrieved with decisions may address them to the Tribunal. This includes decisions concerning PBRs as well (the Act, Sections 29(1)(b)-(e)). The Tribunal has only recently been formed. On 15th September 2006, the Kenya Gazette announced the appointment of a three-member *Seeds and Plant Varieties Arbitration Tribunal* with Professor Patricia G. Kameri-Mbote as Chair (Kenya Gazette, 2006).

3.2 *The Seeds and Plant Varieties (Plant Breeders' Rights) Regulation, 1994*

It is useful to recall that Part V of the Act remained dormant on account of the absence of any implementing measures (cf. Yamin, 2003). In 1994, the Seed and Plants Varieties (Plant Breeders' Rights) Regulation (1994)²² (henceforth, the PBRs Regulation) was enacted, entering into force on 25th November 1994. However, making the provisions operational had to wait for the establishment of a regulatory body. In March 1997, Kenya Plant Health Inspectorate Service (KEPHIS) an autonomous regulatory body was instituted and endowed with powers to regulate the seed market. Within KEPHIS is the Plant Breeders' Rights Office that administers the PBR system. Consequently, only in 1997 were the first applications 'accepted' and the first grants were issued in 2003 (see below). As such, applications were initially accepted by the Ministry, but gazetted for 1997 when KEPHIS and the Plant Breeders' Rights Office became functional (Interview, Senior Regulator).

It has been observed that the horticultural and floricultural industries were strong *demandeurs* for operationalising the PBRs part of the Act (cf. Louwaars et al., 2005,

²² Kenya, (2002), *Seeds and Plant Variety Act 1972*, Laws of Kenya Cap 326, UPOV Gazette No 94, 35 – 54.

p2). Alongside this, it must be remembered that Kenya, as signatory to the WTO Agreements, had to fulfil its obligations to the TRIPs Agreement, in particular Article 27(3)(b). In a prima-facie technical sense, the passage of the PBRs Regulation allowed Kenya to meet its obligations to TRIPs (Otieno-Odek, 2001). As Otieno-Odek suggests, “to further strengthen Kenya’s position on plant variety protection”, it sought membership to UPOV’s 1978 Convention. There is a long history of engagement between UPOV and legislative drafters in Kenya, which includes the *informal* sharing of the PBRs Regulation in 1995 (cf. section 3.6). With the formal accession requested in September 1996, UPOV examined Kenya’s laws for conformity with UPOV principles and recommended three specific amendments and placed accession contingent on these being made (UPOV, 1996)²³:

- Deletion of Rule 1(1)(b) (in Fourth Schedule, Part II) which added some non-trivial qualifications to requirements concerning uniformity and stability.
- Deletion of the words “and the agroecological value must surpass in one or more characteristics that of existing varieties according to results obtained in official tests” in Part II of the Fourth Schedule appearing at the end of Rule 1(1)(d).
- Amending the novelty criterion in Rule 2 (Part II, Fourth Schedule) to read as follows: “Provided that the restriction imposed by this sub-paragraph shall not apply to sales or offers or exposures for sale made outside Kenya – (a) in the

²³ The references to rules in the following bullet points are to the 1991 text of the Act.

case of trees and vines during the period of six years, and (b) in any other case during the period of four years, ending with the date of the application.”

These changes were made; thus, ensuring that Kenya’s legal system for PBRs was in conformity with the 1978 Act of UPOV. Consequently, Kenya acceded to the 1978 Act of the UPOV Convention on 13th April 1999 and this entered into force on 13th May 1999. The *Statute Miscellaneous Amendment Bill, 2000* was established to domesticate UPOV 1978 (Otieno-Odek, 2001). It is for all these reasons that there is striking similarity between the Kenyan legal system and UPOV.

The scope of application of the law

The application of the provisions for the grant of PBRs is circumscribed and does not apply to all plant genera and species. In particular, Part V of the Act (section 17(1)) states that the rights may be granted in respect of plant varieties of such species or group as may be specified by a Scheme made by the Minister.

Conditions for grant of protection

PBRs are awarded to the person who bred or discovered the variety or his successor (the Act, section 18(2))²⁴. The conditions for grant of protection are elaborated in Part II of Schedule Four – and these, following the previously noted amendments, adhere closely to the 1978 Act of UPOV template of (commercial) novelty and DUS (distinct,

²⁴ In the PBR Regulation, ‘breeder’ is defined as the ‘person who discovers or breeds a new plant variety’ (section 2).

uniform and stable). Paragraph 1 sets out the DUS criterion that a plant variety must be 'sufficiently distinguishable by one or more important morphological, physiological or other characteristics' from any other varieties whose existence is common knowledge; be 'sufficiently varietal pure'; be sufficiently uniform or homogenous; and be stable in its essential²⁵ characteristic (cf. the Act, Part II, Schedule Four, Section 1(1)(a)- (d)). Common knowledge refers to cultivation, commercial exploitation or inclusion in a recognisable botanical reference collection (Ibid. section 2).

Paragraph 2 sets out the requirements for novelty. This can be generally considered a requirement for 'commercial novelty' requirement (Rangnekar, 2002). For instance, the variety, materials derived from it, or materials forming parts of it, will only be protected when it has not been offered for sale in Kenya or elsewhere (Ibid. section 2(1)).

However in the case of trees and vines, this restriction does not apply for varieties sold outside Kenya during the 6 years before the date of the application and during the last 4 years in the case of others. This latter qualification was, as noted earlier, introduced following UPOV's review of Kenya's laws.

These two sets of conditions for grant of protection are consistent with UPOV (art. 6, 1978 Act). However, earlier the Act had different requirements. Of significance was the text deleted from Rule 1(1)(d) that set out a test for agroecological value. This, UPOV's review for conformity notes, "is a departure from the principles of the UPOV Convention. The Convention does not consider that the value of a variety should be taken into account for the purposes of protection" (UPOV, 1996, paragraph 16).

²⁵ The term 'essential' remains undefined in the Act and in the PBRs Regulation. It was difficult to get a clearer understanding of the term and/or its operational value in terms of the DUS testing procedures.

Deletion of this requirement, along with other amendments to the law, became conditions for Kenya's accession to the 1978 Act of UPOV.

Scope of Protection

The scope of protection offered under the Act is similar, though broader, to the scope set out in UPOV's 1978 Act (art. 5). In terms of duration, PBRs are awarded for a minimum period of 15 years and a maximum period of 25 years (the Act, 19(1)-(3)). In the case of fruits, forests and ornaments trees and grapevines a minimum period of 18 years is provided (Ibid. 19(2)). As in UPOV's 1978 Act (Article 5(4)), which allows Member states to grant more extensive rights in respect of certain botanical genera or species, the Act in Section 19(5) makes provisions for extending the duration of the right with a maximum total duration of twenty-five years. The right-holder has to pay the required fees for the duration of protection (see below, fees).

The subject matter of the rights is a key component in determining the scope of protection. The Act in Section 20(1)(a) sets out the rights to permit the breeder or to authorise others to produce the 'reproductive material'²⁶ of the variety for commercial purposes, to commercialise it, offer it for sale, export it, or to stock it for any of these purposes²⁷. Additional provisions for cut blooms and flowers exist in the Fifth Schedule²⁸. For instance, the right-holder may be granted the exclusive rights to authorise others to produce or propagate that variety in order to sell parts or the

²⁶ Earlier the Act referred to 'propagating material', which upon UPOV's review for conformity was changed to 'reproductive material' (UPOV, 1996, paragraph 12).

²⁷ In comparison to UPOV78 (Art. 5(1)), this is more comprehensive as it additionally includes 'exports' and 'stock' which are not mentioned by UPOV78.

²⁸ Similar provisions for expanding the scope of protection in particular species exist in UPOV78 in Article 5(4).

products of the variety. Much like UPOV's 1978 Act (Article 5(3)) where a research exemption is articulated, the Act in Section 20(1)(b) spells out an exemption for activities "undertaking solely for research purposes or for developing new varieties". The Fifth Schedule in paragraph 2 limits the research exemption clause; thus extends the scope of protection. This is achieved by requiring the authorisation of the breeder when the repeated use of the reproductive material of the protected variety is necessary for the production of the variety. A similar provision exists in UPOV's 1978 Act in article 5(3) – and this is well acknowledged to refer to the use of protected varieties as parental material for the breeding of F1-hybrids.

It is important to note that there is no explicit exemption for seed saving/exchanging activities of farmers – this again is a reflection of the cognitive correspondence with UPOV's 1978 Act. However, the Act in Section 20(5)(a) says that 'the sale of reproductive material of protected varieties does not imply that the breeder authorises the purchaser to produce the reproductive material that was sold to him'. No doubt, a farmer is prohibited from selling seeds because of the seed certification regulations.

Infringements of the PBRs are actionable offences that entitle the right holders to all remedies including damages, injunctions and accounts (the Act, 20(1)(b)). Nor is it an infringement if the reproductive material is sold outside Kenya, unless it is subsequently used in Kenya (the Act, 20(2)). Provisions exist for terminating the rights as well. General administrative reasons for termination are included. For example, the rights will terminate when either the holder surrenders the right (the Act, 19(6)) or the Minister cancels the right or the extension of the duration because the holder had provided false information (the Act, 19(7)-(8)). Further, the Act in Section 25 makes it an offence to provide false information when meeting the obligation to provide a sample under Section 22, in a Tribunal appeal under Section 25 and in the application

for a PBR. Similarly, right holders are required to be able to provide a sample of the reproductive materials to the authorities when requested and the failure to do so may result in the cancellation of the rights (Ibid.).

Public Interest Provisions

It is normal practice to have measures to protect the public interest in regulations concerning intellectual property rights; thus, provisions to restrict the exercise of the rights being granted. These tend to be either in the form of provisions for compulsory licensing, provisions for exemptions to the exclusive right (see above) and marking out areas where rights may not be granted. The Act in Section 23 marks out measures for granting compulsory licenses. For instance, rights holders are obliged to stock the market with the propagating material at a reasonable price. Failure to do allows for a compulsory licence to be issued. However, the rights holder must first have been issued with a notice to rectify the situation and he must have failed to do so within the specified time.

Administration

The administration of the PBR system is reflective of the institutional complexities of protecting plant varieties. Apart from the *Seed Regulation Committee* (see above), the PBRs Regulation envisions a *Plant Breeders Committee* (section 3). The directors of the Kenyan Agricultural Research Institute, the Horticultural Crops Development Authorities, the Kenyan Forest Research Institute, the National Seed Quality Control Service, and a representative from each the seed merchants and plant breeders constitute this committee. While the absence of any representative from farming communities is notable, there are provisions for co-opting members to represent

interests that are considered required (the PBRs Regulation, 3(2)). The Committee meets at least once a year to establish seed policy and review regulations and standards. Beyond this Committee, the actual administration of PBRs lies in the hand of Kenyan Agricultural (KARI), a national agricultural research institute that has been the main formal breeding and research institution in Kenya. Subsequently, administrative responsibility was transferred to the KEPHIS. Within KEPHIS is the Plant Varieties Protection Office, which administers the plant breeders' rights in Part V of the Act and operates under the Ministry of Agriculture and Rural Development (Kameri-Mbote, 2005). As revenues will increase with the increased subscription to the system, plans of making KEPHIS an independent organisation exist (Interview, Senior Regulator).

KEPHIS employs 4 examiners and 10 technicians (Louwaars, et al., 2005). Most of the applications in agricultural crops come from domestic breeders. The applicant is expected to provide descriptors, which are then confirmed by KEPHIS through their field trials. In the case of ornamental and horticultural crops, the applicants are almost entirely foreign nationals and the DUS tests are conducted overseas; thus presenting KEPHIS with a relatively limited role. The latter is also an indication of the benefits of UPOV membership.

Another element of the administrative side of this law is the Tribunal set out in Part VI of the Act (see above). The Tribunal is established to hear appeals against the refusal of an application to register new plant varieties in the plant varieties index, cancellation of the grants of PBRs, refusal or allowing of an application of PBRs or an application for an extension of the duration of PBRs, termination of the extension of duration and matters relating to the grant of compulsory licenses. Reflective of the institutional

complexity that a *sui generis* system heralds – and introducing IP law, in general – the Tribunal was only established in September 2006 (see above).

The cost of applying for and maintaining a PBR are given in the accompanying table 6 (cf. PBRs Regulation, section 29). In

addition to the costs noted here, there are the fees for variety testing and release – the National Performance Trials. The latter is part of the regulatory system of the seed market. Thus, commercial transactions in seeds are restricted to those varieties that

Application fee	200
Test fees	600
Fees for granting of rights	240
Annual renewal fees (per year)	200
Application for compulsory license	70
Application for extension of duration	100
^a All figures in US \$	
<i>Source:</i> Seed and Plant Varieties (Plant Breeder's Rights) Regulation, 1994.	

have successfully completed the trial (Interview, Senior Regulator). A third element to the cost of a PBR would be the costs associated with enforcing the rights. While respondents are acutely aware of this component they tended not to share information on their experience. Overall these costs – explicit and implicit – have important bearing on the 'effectiveness' of a PVP system and how widely subscribed it will be.

A recent study observed the following: "The need to cover the costs of variety protection has to be balanced by the need to establish effective incentives for stimulating widespread invention and achieving equitable results for all sectors of the farming community" (Louwaars et al., 2005, p83). Kameri-Mbote (2005, p17) notes instances of public university breeders' not applying for PBRs and also mentions of a local breeder withdrawing a variety from field trials on account of inadequate funds. Taking the cost of getting a PBRs grant at US\$1040 and leaving aside the costs for

annual renewals, this works out to 250% of the Kenyan per capita income²⁹. Further, as is explored below, concerns remain of the dynamic impact of changing incentive structures on the orientation of plant breeding, particularly in the public sector.

3.3 *The Protection of Plant Material through Patents*

Like other colonised nations, Kenya had patent laws scripted in and administered by the occupying colonial power. In this case, since 1897 when Kenya became a British colony it came under the jurisdiction of the *Patent Registration Act, Cap 508*. Post independence developments were slow to come by with Kenya's first national patent law being passed only in 1989: the *Industrial Property Act of 1989*³⁰. This Act came into force in 1990 and is regulated by the *Industrial Property Regulations, 1993*. On account of obligations arising out of the TRIPs Agreement, the *Industrial Property Act, 2001*³¹ was passed. It deals with Patents, Utility models, Industrial designs and Enforcement. It is regulated by the *Industrial Property Regulations*³² and came into force on May 1, 2002. Some notable changes that were introduced include the following:

- Section 21 which introduces that notion of 'invention' – and exceptions to the same – as set out in TRIPs

²⁹ In 2000, the per capita income in constant US dollars was 413 – and taking the 'cost' of securing a grant as the sum of application fees, test fees and fees for granting the right. No doubt, other fees will necessarily be incurred (e.g. NPT trials, renewal fees) and additional costs related to commercial seed production.

³⁰ Kenya, *Industrial Property Act*, Cap. 509 of the Laws of Kenya, (1989, <<http://www.wipo.int/about-ip/en/ipworldwide/pdf/ke.pdf>>

³¹ Kenya, *Industrial Property Act*, Act No. 3 of 2001, Cap. 509 of the Laws of Kenya, (2001). Published in Kenya Gazette Supplement, 03/08/2001, No. 60 (Acts. No. 3).

³² Industrial Property Regulations, 2002, Kenyan Gazette Supplement No.31.

- Sections 72-77 that implement – rather closely – the compulsory licensing provisions of TRIPS.
- The revision of the duration of protection to adhere to TRIPS (cf. Section 60).
- Section 110 where the reversal of burden of proof in disputes regarding process patents is introduced.

Patentability of plant material

Particular categories of plant material (i.e. broadly biological resources) are patentable under IPA, 2001 within the terms of Section 26. To be clear, Section 26 follows a well-established routine of demarcating and differentiating juridical space that would map onto biological space in terms of ‘essentially biological’ and ‘microbiological’. The *Strasbourg Convention*³³ pioneered this effort and it has continued in other legislative adventures, notably the *European Patent Convention*³⁴ and most recently in the *Trade-Related Intellectual Property Rights Agreement*³⁵. Thus, the IPA, 2001, in Section 26(a)

³³ The Convention on the Unification of Certain Points of Substantive Law on Patents for Inventions (1963).

³⁴ Article 53 reads as follows,

European patents shall not be granted in respect of:

(a) inventions the publication or exploitation of which would be contrary to “ordre public” or morality, provided that the exploitation shall not be deemed to be so contrary merely because it is prohibited by law or regulation in some or all of the Contracting States;

(b) plant or animal varieties or essentially biological processes for the production of plants or animals; this provision does not apply to microbiological processes or the products thereof.

³⁵ Article 27.3 reads as follows,

Members may also exclude from patentability;

[...] (b) plants and animals other than micro-organisms, and essentially biological processes for the production of plants or animals other than non-biological and microbiological processes. However, Members shall provide for the protection of plant varieties either by patents or by an

states that non-patentable inventions include “plant varieties as provided for in the Seeds and Plant Varieties Act, but not parts thereof or products of biotechnological processes”. In paragraph (b) it introduces other grounds for considering an invention as non-patentable, namely “inventions contrary to public order, morality, public health and safety, principles of humanity and environmental conservation”.

A number of comments can be made about this construction of domestic law. First, there are grounds for legal ambiguity in the phrase “plant varieties as provided ...”. It could be argued that plant varieties not provided for in the Act constitute patentable subject matter. This may include those plant varieties that are of species or genera that the Minister has not (yet) specified a Scheme; thus, not provided for in the Act. Further, ‘provided for’ can also be narrowly read as ‘protected by’; thus, presenting an interpretation where plant varieties that fail to meet the Act’s conditions for grant of protection are to be considered patentable subject matter. As such, demarcating and differentiating the juridical spheres of patents and PBRs has always been problematic. When scripting the laws in Europe in the 1960s³⁶, the hope, as Strauss (1987, p724) observed, was for two fields “without any overlapping and without conflict”. European case law provides ample evidence of the difficulties in defining the contours of the two fields and the temporality of the distinction.

A second comment on this domestic architecture goes beyond the script of the law to the distance between rhetoric and practice. This, as discussed below (cf. section 3.6), draws attention to Kenya’s leadership and advocacy at the TRIPs Council for a ‘no

effective *sui generis* system or by any combination thereof. The provisions of this subparagraph shall be reviewed four years after the date of entry into force of the WTO Agreement.

³⁶ Reference is to both the founding UPOV Act of 1961 and to the Strasbourg Convention.

patents on life' position, which unfortunately it has failed to translate into the architecture of domestic law. It has been suggested by some that these omissions were caused by the desire to speed up the implementation of the Act because of the Kenyan Medical Research Institute's involvement in the discovery of KEMRON, a drug with curative properties for AIDS (Yamin, 2003).

Administration

The Kenyan Industrial Property Institute (KIPI), under the Ministry of Trade and Industry, administered the IPA 2001 (Kameri-Mbote, 2005). KIPI replaces the Kenyan Industrial Property Office (KIPO), whom administered the IPA 1989. The new institution is a corporation with a Board of Directors consisting of representatives of the Ministry, the National Council of Science and Technology, the Attorney General's Office, the Law Society and other groups such as a representative of the Institute of Kenyan Manufacturers and Jua Kali Associations (workers in the informal sector). KIPI considers applications for industrial property rights, screens technological transfer agreements and licenses, promotes innovation and inventiveness, and provides information for technological and economic development. It is co-funded by the Ministry, earnings from its activities and other funds such as donated funds.

3.4 *Other Regulatory Measures*

Seed Market Harmonisation

Beyond the *Seed and Plant Varieties Act*, the seed market is experiencing significant changes on account of a process of regional harmonisation (see Hezron & Karugia, 2002). The USAID and the World Bank are funding a project aimed at harmonising seed policy in East Africa under the Sub-Saharan Seed Initiative that is called the

'Harmonisation of Seed Policies and Regulations in Eastern Africa Project'. Started in 1999, the project initially involved only Tanzania, Kenya and Uganda. The project now involves Rwanda, Ethiopia, Eritrea, Burundi and Sudan (GRAIN, 2005). The project focuses on five key areas; (i) variety evaluation, release and registration, (ii) seed certification, including harmonising definitions, standards etc (iii) phytosanitary regulations, (iv) plant variety protection, (v) laws and regulations governing development of the seed trade of local seed industries and entry of foreign seed companies, including those from neighbouring countries. At present, harmonisation of variety evaluation has been the most successful, while progress in other areas is slower (Tripp, 2003). These countries are also in the process of setting up a catalogue of seeds and registering all crops in line with the UPOV Conventions' DUS criteria.

Biosafety Regulation

Testimony to the problems in implementing provisions in a complex global architecture of IP law and interfacing regulations is the case of biosafety. In 1998, an interim Biosafety Regulation was put in place according to the Science and Technology Act, Cap 250 of the 1980 Laws of Kenya (see Annex 2, Mugoya et al., 2004). This Act also set up the National Committee of Science and Technology (NCST), which set up the National Biosafety Committee (NBC) and the Kenyan Biosafety Guidelines. There is now a four stage process involving an internal assessment by the applying institutions through their own Institutional Biosafety Committee, another assessment by the panel of experts in the NBC, a final decision on the biosafety certificate by the NCST (op. cit) and an application for an import licence from KEPHIS (de Groote et al. 2004). The IPRs institutions work closely with the biosafety institutions and KIPRI is a member of the NBC (Kameri-Mbote, 2005). The NBC was involved in the granting of permission for the importation of transgenic genes in the Sweet Potato Project, the IRMA Project, the

Bt Cotton project and the Rinderpest vaccine and establishing guidelines and procedures for a biosafety framework. Since 2002, the development has been funded by the UNEP-GEF Project on the Implementation of the National Biosafety Framework for Kenya which commenced in 2002 and is due to end in September 2005 (Mugoya et al., 2004). Preparation of a Draft Biosafety Bill begun in 2003 and the Bill was circulated to the parliament in 2004, but has yet to be adopted (GM Watch, 2004). Despite the flux, in July 2004, KARI opened a Biosafety Green House (BGH) where the BT genes were initially tested before proceeding to field trials (Interview, Lawyer; de Groote et al., 2003).

Environmental Management Act, 1999

The Environmental Management and Co-ordination Act was enacted in 1999 and came into force on 14th January 2000. It is the key statutory instrument regulating access to genetic resources and benefits sharing. Section 7 sets up the National Environmental Management Authority (NEMA) to administer the regime and the Authority are required to formulate guidelines and prescribe measures for the sustainable management and utilisation of genetic resources. NEMA works closely with institutions such as KIPI and KEPHIS. Along with KIPI, NEMA is also a member of the National Biodiversity Committee (Kameri-Mbote, 2005). Despite this institutional interfacing, there seems to be no specific regulatory provisions that allow for the interfacing of the Environmental Management and Co-ordination Act with regulations concerning patents and PBRs. In fact, in a response to a question raised by the European Communities and their Member States regarding the existence of additional conditions apart from those in Article 29 (of TRIPs) for the grant of a patent, Kenya clarified that there were no additional requirements (WTO, 2004). This is another instance of the distance between

the rhetoric in Geneva expressed by Kenya and the substantive architecture of domestic law that it has implemented.

3.5 *Commentary*

Article 27.3(b) of the TRIPs Agreement is remarkable in being one of the rare instances of intra-Quad differences given the explicit exclusion of plant varieties from patents under the European Patent Convention. Consequently, the obligation is relatively open-ended in that it does not specify the instrument of intellectual property protection but, instead, identifies possible options. The implementation options are either patents or an effective *sui generis* system, or a combination of the two. Remarkable through its absence is any reference to the UPOV – the pre-existing multilateral treaty providing for a *sui generis* system for the protection of plant varieties³⁷. It has been suggested by Jayashree Watal (2001, p140) that some Members considered the 1978 Act of UPOV inadequate and a reference to the 1991 Act would have been premature as it was not yet in force. Clearly, Members have wide latitude in implementing their obligations under Article 27.3(b) with legal imagination reined in by a requirement to have an *effective sui generis* system.

In Geneva, Kenya has occupied a position of leadership on Article 27.3(b) for the Africa Group of countries. A useful example of this leadership is the submission during the

³⁷ In comparison, the obligations for copyright begin with an obligation to adhere to Berne Convention's Articles 1 to 21 and the Appendix of Berne Convention (1971) (cf. Article 9.1, TRIPs Agreement).

mandated 1999 review of Article 27.3(b). In this submission on behalf of the Africa Group, Kenya makes the following substantive points (WTO, 1999b)³⁸:

- Extending the transitional period: The deadline for implementing obligations under Article 27.3(b) should be revised with the transitional period commencing with the completion of the substantive review of Article 27.3(b). Thus, in line with Articles 65(1) and (2), namely, five years from the date the review is completed.
- ‘No patents on life’: Noting the artificial distinction between biological and microbiological organisms and processes, the submission proposes a clarification stating that plants and animals as well as microorganisms and all other living organisms and their parts cannot be patented, and that natural processes that produce plants, animals and other living organisms should also not be patentable.
- Integrating TRIPs with other multilateral treaties: The submission draws attention to relevant developments in other fora, notably the FAO’s International Treaty and the Convention on Biological Diversity, which it recommends that TRIPs seek to harmonise with. In substantive terms, the submission makes two recommendations. First, it seeks the insertion of a footnote to Article 27.3(b) that states that a *sui generis* system can include provisions for the protection of indigenous innovations and traditional

³⁸ In the TRIPs Council meeting discussing this and other submissions concerning the 1999 review, Kenya formally “lent their full support” to the Indian submission as well (see, WTO, 1999a, paragraph 75).

knowledge. Second, it also seeks the “continuation of the traditional farming practices including the right to save, exchange and save seeds, and sell their harvest”.

This places a very high watermark with which to assess domestic law making. And, this high standard has not been missed by other WTO Members. Thus, for example, Japan in the discussions during the 1999 review reminded WTO Members that Kenya was already a contracting party to UPOV (WTO, 1999a). The UPOV connection adds, as will be shortly noted, an essential constraint to the space for legal imagination in implementing Article 27.3(b).

In terms of all three proposals to the TRIPs Council, Kenya has failed to live up to or implement any of them. To begin, as it had the foundational legislation in place in 1972 (i.e. the Act) and the regulation implementing the provisions for PBRs in 1994 – it had *prior* to the completion of the TRIPs Agreement, a system for plant varieties. Thus, the recommendation for extending the transitional arrangement does not apply – and by extension the other recommendations are also less relevant. This is only apparent. The Act and the Regulation have been subsequently revised; thus suggesting that *time* continued to exist for changing the law. However, keeping the first recommendation on extending transitional arrangements aside, focusing on the other two brings out the distance between Geneva-rhetoric and the construction of the domestic architecture of IP law.

From the review of the law in this section it is clear that neither has Kenya sought to adhere to its position on ‘no patents on life’ nor has it effectively integrated the measures and provisions in the CBD or the FAO’s International Treaty. The system instituted in Kenya in many ways mimics the architecture of law that has evolved in

Europe. This is particularly transparent in the manner in which the *sui generis* system protects plant varieties and the patent system seeks out a specific exclusion for plant varieties whilst allowing for granting patents on microbiological organisms. This demarcation between juridical spheres of patents and PBRs to map onto biological space in terms of essentially biological and microbiological was initiated during the elaboration of the UPOV system and the Strasbourg Convention. By permitting patents on parts of plants and/or products of biotechnological processes, Kenya has deviated from its own Geneva rhetoric. It is another matter, as noted above in section 3.5, that the exclusion for plant varieties is to an extent legally ambiguous. Finally, nothing in the laws that have been reviewed here suggests the incorporation of measures and provisions residing in the CBD or the FAO's International Treaty. To be clear, whilst the *Environmental Management Act, 1999* is designed to regulate access to genetic resources and benefit sharing, there is nothing in the IP laws that seek to complement or strengthen these provisions. As noted earlier, Kenya has during the WTO review of its legislation in 2001 clarified that there are no additional requirements for patent grants beyond those set out in Article 29 (TRIPs) (WTO, 2004; cf. section 3.4). Consequently, there are no provisions in the IP laws for access and benefit sharing or disclosure of origin. And, reflecting the provisions in the FAO's International Treaty, there are no provisions establishing the right of farmers' to save, re-use, exchange or sell seeds.

One of the factors influencing the shape of domestic IP law concerning plant material in Kenya has been the actors in export-oriented horticulture and floriculture industries. It has been noted that early efforts in introducing the Act and seeking accession to UPOV were prompted by this sector of the economy. The early template for Kenya's PBRs system was inherited from the UK and the Netherlands – the former providing the

schema for the Act and the latter for the seed certification system. No doubt, many of the actors involved in the export-oriented sectors are expatriates from these countries. Thus, this foundational element to the PBRs system has locked-in Kenya into a particular legal framework. Subsequent engagement with UPOV explains the cognitive lock-in to a particular template even when the space (and time) for creative legal imagination existed. From early informal exchange of the draft law, UPOV has been closely involved in the elaboration (and revision) of Kenya's PBRs system. In particular, the 1996 review for conformity with the UPOV Convention marked out three specific amendments as conditions for accession. The process of revising domestic law was closely monitored and reported to UPOV at its subsequent annual meetings. For example, at the 32nd Ordinary Session (in 1998), the annual report notes that Kenya has revised its domestic law and is preparing its instrument of accession to the 1978 Act (UPOV, 2000a, Annex III). When Kenya accedes in 1999, it expresses thanks and acknowledges the help that "went far beyond what the Office might usually do" (UPOV, 2000b, paragraph 6).

4 THE IMPACTS OF PBRs

The economic literature review presented a number of critical observations³⁹. To begin, it notes the remarkable lack of theoretical sophistication or robust methodology. In particular, there has been little transference of methods and models from the economic literature on patents. Apart from a few recent contributions, much of the literature is avowedly empirical and based on normative considerations. The review sought to schematise the literature across four themes. The first concerns research and

³⁹ See Rangnekar (2006): A review of the economic literature on plant breeders' rights. IPDEV, available at www.ip4development.org.

development (R&D). A central premise grounding IPRs is the inappropriability of knowledge; thus, the availability of IPRs is said to attract private sector investments in R&D. Theoretically, the increase in investments must be related to historical trends and the 'effect' of IPRs disaggregated, if at all possible, from other influencing factors. Concern is also devoted to the quality of the investments (i.e. the direction of R&D) and whether there is an economy-wide increase or if it is the case that private investments have 'crowded out' public investments. The second theme concerns market consolidation. There is equal academic and policy concern on the impact of IPRs on market competition. This is the classic trade-off associated with IPRs and a number of policy parameters exist (e.g. the duration and scope of rights, exceptions and compulsory licensing) to mitigate some of the adverse consequences of IPRs. While some increase in concentration might be the price society pays for technological progress, the question remains whether increases in concentration persist and how concentration in the market for knowledge (i.e. IPRs) relates to levels of concentration in input markets (seeds, etc.). The third theme is access to technology. It is quite likely that foreign breeders and local (private) breeders will increase their breeding activity in some crops. However, access to technology and/or the transfer of technology is another matter. The review draws attention to recent theoretical contributions that propose that the proliferation of IPRs has led to an anti-commons property regime; thus, suggesting that the transaction costs to conduct research has increased. The final theme relates to the distribution of benefits, which draws together many of the previous concerns. Theoretically, this focus is on the tension between static, allocative efficiency and dynamic trade-offs; thus, drawing out how the benefits and costs are distributed across different groups in society (public, private, farmer, breeder, etc.). Sophisticated models have been developed to examine the distribution of benefits and costs associated with novel biotechnological products (e.g. Bt-cotton). The literature is also

concerned with how the introduction of IPRs and novel technologies impact traditional practices (e.g. farmer seed saving and exchanging). These themes provide the broader context to the analysis in this section.

Kenya only recently, in 1994, made operational the provisions in Part V of the *Seed and Plant Varieties Act, 1972* for PBRs. The first applications were received in 1997 and the first grants issued some six years later in 2003. Thus, in terms of economic analysis, this provides too short a period to make any robust claims on trends. This has not deterred some commentators (e.g. GRAIN, 1999; UPOV, 2005b). At best, some suggestive claims on the *use* of the PBRs system and emergent pattern of ‘inventive’ activity might be made. For instance, data could indicate future orientation of the breeding sector, such as the crops being favoured and the emergent division of labour between public and private breeders. However, beyond the short time period, the data is not adequately detailed to allow the desired analysis. For example, the PBRs data does not give applicant information for each application/grant; thus, denying any possibility of estimating the share of applications/grants at the level of applicant. It is with these lacunae that the research is presented.

4.1 *Research and Development*

As noted in the economic literature review, a popular treatment of the ‘impact of PBRs’ with respect to R&D is to focus on proxy indicators like the number of applications or grants for PBRs. This is particularly useful when data on R&D expenditures and other indicators of inventive activity are not available – as is the case here.

Table 7

Kenya PBR Activity, 1997-2004						
	Applications			Grants		
Year	Residents	Non-residents	Total	Residents	Non-residents	Total
1997	11	128	139	0	0	0
1998	42	33	75	0	0	0
1999	16	45	61	0	0	0
2000	24	45	69	0	0	0
2001	164	33	197	0	0	0
2002	11	27	38	0	0	0
2003	7	25	32	32	77	109
2004	16	45	61	0	41	41
Total	291	381	672	32	118	150
	43.30%	56.70%		21.33%	78.67%	
<p><i>Note:</i> (1) Five grants ceased to be in force; thus total grants at the end of the year would be 36. <i>Source:</i> Kephis (various years), <i>Annual Report</i>; supplemented by UPOV (2005a), <i>Plant Variety Protection Statistics, C/39/7</i>.</p>						

In the first year of operation itself there were 139 applications for PBRs (Table 7). The applications were overwhelmingly from non-residents (73%)⁴⁰. Subsequently there were fewer applications submitted. Though, in 2001 there was a ‘surge’⁴¹ with 197 applications being submitted – and significantly, the applications were overwhelmingly from residents (83%) with public breeders being the predominant applicants. This ‘surge’ in applications by residents has been seen as evidence of “increased awareness among breeders in public institutions of the benefits of protecting their varieties” (UPOV, 2005b, p56). This is a rather simplistic treatment of the phenomena and itself draws attention to the paradox of the public sector seeking private rights (cf.

⁴⁰ It has been suggested that applications submitted prior to the setting up of KEPHIS were initially held in abeyance and thus accorded a start date of 1997 (Interview, Senior Regulator).

⁴¹ This is the term used by UPOV (2005b, p56).

section 4.3). It is quite likely, as some respondents' state, that firms (public as well as private) delayed the release of varieties. Economists have recognised this approach in terms of racing and waiting games (see, Dasgupta, 1988). In fact, the *surge* has a rather simple explanation: a policy intervention of granting amnesty to extant varieties. The amnesty was essential because extant plant varieties would have fallen foul of the (commercial) novelty condition in Rule 2 (Fourth Schedule, Part II, the Act; see section 3.3 above). It is this that allowed the submission of PBRs application (Interview, Executive, Biotechnology NGO; Senior Regulator). The hype and explanation concerning the 'surge' aside, the fact that breeders have sought to apply for PBRs is in a limited sense at least indicative of confidence in the system⁴².

The first grants were only made in 2003; some six years after the first applications were lodged (Table 7). In 2003, the number of grants issued was 109 – of which, non-residents collectively received 70%. The following year 41 grants were issued – and national applicants did not get any grants. In the two years for which (complete) data is available (2003/04), non-residents held 78% of the grants. As these are early years much should not be made of this distribution of PBRs grants⁴³.

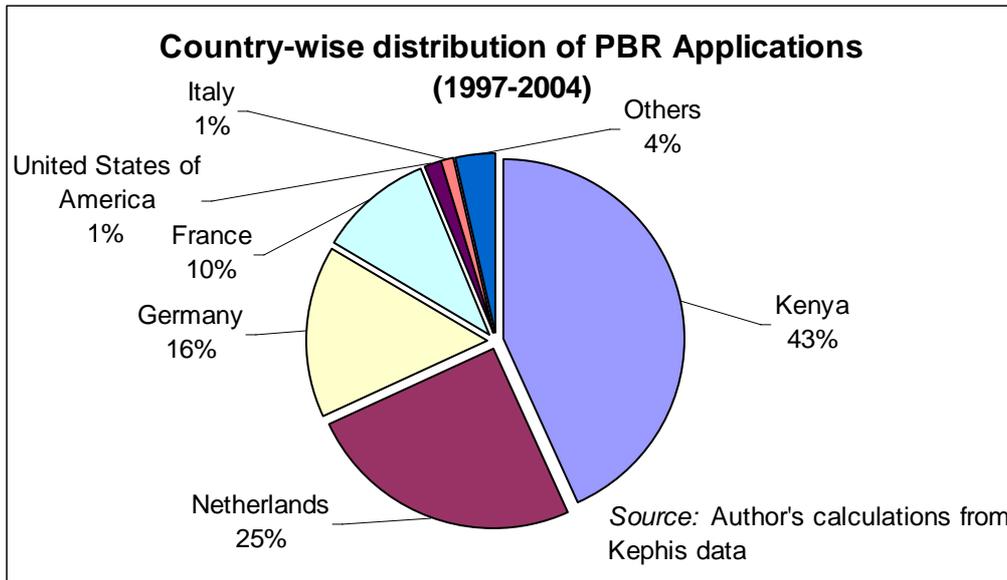
PBRs data collected is disaggregated at the level of the nationality of the applicant; though, unfortunately, without the benefit of calculating applications or grants by name of applicant (Figure 6). As noted earlier, as a group, non-resident applicants dominate. However, if the data is examined in terms of individual countries, then Kenyan nationals collectively account for the largest number of applications, accounting for

⁴² Acknowledgement is made of Derek Eaton's comments at the IPDEV meeting (Chatham House, London, 3-4 October 2006) that ground this point.

⁴³ For a contrasting view see GRAIN (1999) which is briefly discussed below.

43%. Applicants holding leading shares are from the Netherlands (25%), Germany (16%) and Italy (10%).

Figure 6



These leading shares are of crucial importance, in part as indication of 'interest' in Kenya and possibilities of technology transfer in the form of either establishing new breeding facilities and/or the introduction of new varieties (a form of embodied technology transfer) (cf. section 4.2). The crop-wise distribution by nationality of applicant is one way to assess this evidence and find patterns concerning breeding strategies (Table 8).

Table 8

Crop-Wise Distribution of Applications, 1997-2004				
	Residents	Non-residents	Total	% Age Share
Cereals				
Maize	55	0	55	8.18%
Wheat	30	0	30	4.46%
Sorghum	7	0	7	1.04%
Barley	7	0	7	1.04%
Industrial Crops				
Tea	33	0	33	4.91%
Pyrethrum	23	0	23	3.42%
Macadamia Nut	11	0	11	1.64%
Sugarcane	6	0	6	0.89%
Oils				
Rapeseed	0	14	14	2.08%
Sunflower	10	0	10	1.49%
Soybean	7	0	7	1.04%
Pulses				
Dry Beans	13	0	13	1.93%
Peas	0	7	7	1.04%
Pasture crops	10	0	10	1.49%
Vegetables				
French Bean	0	14	14	2.08%
Potato	4	0	4	0.60%
Cassava	2	0	2	0.30%
Ornamentals				
Rose	0	247	247	36.76%
Alstroemeria	0	28	28	4.17%
Limonium	6	8	14	2.08%
Total Applications			672	100%
<i>Source: Author's calculations from Kephis data</i>				

Even a cursory look at the table reveals a striking socio-technological division of labour between nationals and non-nationals:

- Applications from residents are exclusively in cereals, industrial crops, oil crops⁴⁴ and pulses
- Applications from non-residents are exclusively in vegetables and ornamentals

This orientation of breeding strategies and the ‘domination’ of non-resident applicants has been noted by civil society organisations (e.g. GRAIN, 1999). These commentators question whether UPOV-styled PBR systems promote both food security and sustainable agriculture. Noting the crop-wise orientation and the domination of overseas applicants, it is felt that the ‘bottom-line’, food production per capita, gets ignored. The question is definitely pertinent; however, issues concerning either food security or sovereignty are more complex and interwoven with livelihood. No doubt, as an FAO note rhetorically states, “[M]ost people don’t eat flowers. But they are an important source of food security because of the income they bring to thousands of people – most of them women – in developing countries” (FAO, 2002). The well-noted growth of the ornamental and horticultural sector in Kenya – corroborated here to some extent in terms of PBRs applications – requires further analysis, not only in terms of how livelihood and entitlements have been affected, but also in terms of the role of IPRs (cf. section 4.2 below).

⁴⁴ Non-residents have applied for protection in rapeseed – in fact all 14 applications are from non-residents. On the other hand, one of the ornamentals, Limonium, has 6 applications from residents and 8 from non-residents. These are the only exceptions to our observation.

Table 9

Maize Cultivars Released			
Period	Public Sector	Private Sector	Total
1964-73	6	0	6
1974-83	2	0	2
1984-93	2	1	3
1994-2003	11	60	71
Hybrids	16	55	71
OPVs	5	6	11
<i>Source: Ministry of Agriculture (2004)</i>			

Breeding activities in maize can be partially analysed through the varieties released⁴⁵. Between 1964 and 2003 there were over 80 varieties released. Most of these varieties (86%) were released in recent years (1994/2003) (Table 9). In fact, with 60 varieties being released between 1997 and 2003, the UPOV sees this as strong testimony to the incentive effect of the PBRs legislation (UPOV, 2005b, p57-8)⁴⁶. Maize breeding, when examined through the lens of varieties released, is heavily oriented towards hybrid maize. Only 11 varieties out of a total 83 were open-pollinated varieties (Table 9). The Ministry of Agriculture has expressed concern about this breeding orientation and recommends a participatory and adaptive research programme (Ministry of Agriculture, 2004, p16-7). This concern is reflective of a deeper malaise in the relationship between research programmes and users. The limited adaptation of some hybrid maize varieties to the diverse agronomic conditions characterising Kenya agriculture is a causal factor. This is complicated by the limited purchasing power of smallholding farmers. Consequently, evidence indicates the purchase and use of certified seeds is declining

⁴⁵ This paragraph is based on Ministry of Agriculture (2004), unless indicated otherwise.

⁴⁶ Section 4 of the report addresses this claim.

with increased use of recycled hybrids, traditional varieties and OPVs with low genetic potential. The declining use of hybrids is considered to be a key causal factor in explaining the diminishing productivity of maize agriculture; hence, the importance of maize breeding.

Finally, the question of whether breeding activity (and investment) has increased. Here, the total absence of data is most disconcerting. The absence of data notwithstanding, it has been suggested that 'breeding entities' have increased from 41 in 1990/96 to 81 in 1997/2003 (UPOV, 2005b, pp61-2). This increase appears to be across the board and includes food crops like maize (an increase from 9 to 16, respectively) and wheat (2 to 5, respectively). For that matter, the number of registered seed companies has also increased from 35 to over 50 in recent years. Impressive as this might be, levels of concentration remain in the maize seed market (table 3). With KSC holding 87% of the market, new entrants face a significant entry barrier. Presently, the low and diminishing uptake of certified seed and the continued import of maize seed would suggest that the increased firm activity is not translating into either market shares or the uptake of quality seeds (Interview, Policy Researcher). As such the continued viability of some new entrants does not appear encouraging. This aside, the clear demarcation between domestic and overseas breeders focussing on food and horticultural crops respectively is undisputable. As noted in the following section, the likelihood of introduction of externally bred food crops is limited. Exceptions to this are the public-private partnerships in agbiotech discussed in section 4.3.

4.2 *Technology Transfer and Transfer of Varieties*

Plant breeding is a *peculiar* technology. Like other science-based and cumulative technologies it is predicated on *open-access* to earlier technological vintages (i.e.

previously released varieties). However, its peculiarity extends beyond this shared feature. Given the embodied technological change delivered in seeds, plant breeding requires local adaptation. As locally useful improvements in germplasm are not generally available 'off-the-shelf' (Tripp & Rohbrach, 2001) there is a need for local adaptation (by breeders) to ensure wide local adoption (by farmers). A pertinent empirical referent to this understanding of plant breeding is the evidence of limited varietal movement between jurisdictions (Srinivasan, 2004)⁴⁷. Using UPOV data on PBRs granted, Srinivasan found that around 18% of wheat, 13.7% of maize, 4% soybean, 46.3% potato, 34.12% of ryegrass, and 25.56% oilseed rape varieties have been protected in two or more countries; thus suggesting a high level of "locational specificity of plant varieties" (p465). This is further corroborated by evidence of the intra-European movement of plant varieties where over 80% of grants to foreigners are to nationals in other European countries. This, Srinivasan explains, is on account of shared agroecological conditions and the Community wide regulatory and protection system.

It is with this insight that a similar exercise was sought for Kenya. In the absence of data on investments and the difficulty of compiling a cross-country dataset, applications for PBRs by non-nationals are taken as a qualified proxy for the *transfer of technology*. In the case of Kenya, PBRs evidence indicates that it is only for horticultural and ornamental species that overseas breeders have sought to protect their varieties in Kenya (Table 8). It is for these reasons that a review of the sector is warranted.

Moreover, the sector is often characterised as a beacon of 'success':

⁴⁷ Multi-country protection is used as a proxy for the transfer of varieties between jurisdictions.

“...varieties of horticultural crops have been introduced mainly by foreign breeders showing a strong interest of foreign breeders to introduce their varieties in Kenya. Most are ornamental varieties (rose in particular) and their introduction has contributed to the diversification of the horticultural sector of Kenya and to the development of trade of horticultural products, in particular ornamental plants, in European and other global markets” (UPOV, 2005b, p58).

Three sets of questions arise with respect to developments in horticulture and ornamentals. To begin, it is important to query the ‘success’ and the factors underlying this ‘success’. Here, specific attention to the role, if any, of IPRs is warranted. Further, questions are also raised about the sustainability and equitable nature of this ‘success’ as that would bring us back to issues concerning livelihood and food security. However, first it is useful to briefly note the developments that have occurred.

Large scale horticultural production in Kenya can be traced to World War II following the need to supply Allied troops in East Africa (McCulloch & Ota, 2002, p2). Yet, at the time of independence, horticultural exports were virtually non-existent, accounting for a mere 0.3% of exports (McCulloch & Ota, op cit). Recognising the significance of this sector, the government instituted the *Horticultural Crops Development Authority* in 1967 under the Agricultural Act Cap 318 (HCDA, 2005, p1). An early entrant into Kenya was Del Monte in 1968, who leased land for producing pineapple for its food producing plants in Kenya. The HCDA played a useful role in enabling the entry of an Australian firm, Cottees (Jaffee, 1995). Cottees set up a food processing joint venture with the parastatal, Kenya Fruit Processing (KFP) and HCDA was instrumental in sourcing key

inputs (e.g. credit, seeds, sprayers, etc.). By the early 1970s, KFP was amongst the top global exporters of passion fruit juice⁴⁸.

In the first decade of independence the sector grew significantly, approximately at 4.4% per annum in real terms, and by 1974 it contributed 3% of total agricultural exports (Minot & Ngigi, 2004)⁴⁹. 1974 is generally recognised as the turning point with the sector experiencing a 'take-off'⁵⁰. This is particularly borne out by statistics: between 1974 and 1990, exports from this sector grew at 8% per annum in real terms. By 1990, fruit and vegetable exports were valued at US\$90Mn and accounted for 14% of total agricultural exports. This contrasts with the succeeding decade, 1990-2000, where the sectors growth was lower. By 2000, the value of exports was US\$167Mn and its share of agricultural exports hovered in the 10-15% band. Beyond growth, it is the diversification of the composition of horticultural exports that is striking. While there are some leading vegetables like French beans, Asian vegetables, and canned pineapple, the exports are composed of over 50 different fruits and vegetables. Beyond fresh fruits and vegetables, Jaffee (1995) identifies a range of pre-packed and pre-prepared products; thus, listing some 75 different horticultural products. The recent expansion of floriculture is possibly more striking (Bolo, 2005). In recent years the industry has expanded at 200 hectares per annum and the HCDA estimates that it account for 60% of horticultural sector; thus, accounting for 8% of total exports. The industry turnover had increased from KSh3.6Bn in 1995 to KSh18.8Bn in 2004. Kenya now account for

⁴⁸ Minot and Ngigi (2004) draw attention to some of the failures in this trying period of the horticulture sub-sector.

⁴⁹ This paragraph is based on Minot and Ngigi (2004), unless indicated otherwise.

⁵⁰ The cut-flower sector had a later take-off. The first rose exports began at the end of 1980s (c. 1988) (Interview, Ornamentals' Breeder).

25% of the flower imports in Europe – making it the largest supplier (Interview, Policy Researcher).

In understanding and explaining the sectors performance, Minot and Ngigi (2004) draw attention to different 'drivers of change': geography and climate, demand and infrastructural spin-offs from tourism industry, effective and flexible private sector entrepreneurs, and stable, supportive policy environment (see also Bolo, 2005). Notably absent is any reference to Kenya's intellectual property regulations or a reference to the agricultural research climate. The former is particularly significant given the passage of the *Seeds and Plant Variety Act* in 1972 and its coming into force in 1975. In fact, this legislation does not even get a mention in Minot and Ngigi (op. cit). In contrast, Bolo (2005) draws attention to the legislation in his study of the floriculture industry; however, also noting the importance of other means of controlling the movement of cut flowers.

Yet, it appears that geography has played a particularly important role. The equatorial climate combined with a wide range of altitudes enables the production of a diversity of tropical fruits and temperate vegetables. However, this is not unique to Kenya and there is ample evidence of the competition from other suppliers (e.g. Côte d'Ivoire – pineapple). With the end of its preferential access to the European market, this geographical advantage can be easily eroded (Interview, Policy Researcher). Further, better quality suppliers (e.g. South Africa and Israel) have already displaced Kenya in particular crops (e.g. avocado). In the case of flowers, Ethiopia has been successful in attracting a number of firms by offering significant inducements. For that matter, some Kenya-based producers (e.g. Oserian) have set up large operations in Ethiopia.

The other factor contributing to the growth has been the direct and spillover effects from the tourism industry. By 1980, Kenya was receiving 372,000 tourists per year – second only to South Africa. This growth had a dual effect. The spillover effect of the tourist trade was the means of air freighting exports. The other was the direct demand generated by tourist trade for high quality horticultural products. It is estimated that much of horticultural production takes place within a 100 kilometre radius of the Nairobi airport. The significance of air freight has been equally significant for the floriculture industry. The main production site, the Lake Naivasha Cluster, which accounts for over 50% of flower production, is located 100kms NW of Nairobi in the Great Rift Valley (Bolo, 2005).

Alongside the international tourist trade, Minot and Ngigi (op cit.) note the role of Asian communities – both domestically and the East African Asian Diaspora to UK and Europe. Domestically, this community had generated the demand for Asian vegetables, which subsequent to their expulsion in the 1970s – has led to the export demand for these vegetables. It was the effective and flexible adaptation of private entrepreneurs to these opportunities that enabled the growth of market channels and export trade. In the case of the Lake Naivasha Cluster it has been suggested that collaborative entrepreneurial activities of key actors has been important. In recent years this collaborative activity has seen the industry respond to criticisms from environmental and human rights group through the formation of bodies like the Lake Naivasha Growers Group and the Lake Naivasha Riparian Association.

Alongside these two sets of drivers has been the macroeconomic situation and institutional context. In comparison to neighbouring countries, Kenya has had a relatively stable macroeconomic situation. Equally significant has been the institutional and policy context promoted by the government. Here, mention is made of the

facilitative role of HCDA, the 'open skies' policies concerning air freight which has led to a lowering of transportation costs, the liberal economic policy, and proliferation of different arrangements between farmer and buyer⁵¹. In comparison to coffee and tea, the sector was never tightly controlled and regulated. Though, this also may explain the lack of integration and linkage between this industry and the local economy, in general, and the national research system, in particular (Interview, Policy Researcher)⁵².

Other commentators draw attention to key factors of production (e.g. Bolo, 2005). Horticultural production is land and labour intensive; thus, allowing Kenya to exploit its comparative advantage of cheap labour and available land. For some commentators this is demonstrative of the "glories of shifting production to Africa" and the plantation-like condition in the horticultural and ornamental sector (Maharaj & Dorren, 1994, pp67-81).

Commentaries fail to emphasise the role of IP regulations, the *Seeds and Plant Variety Act, 1972* and the subsequent *Seeds and Plant Varieties (Plant Breeders' Rights) Regulation, 1994*. Concluding on the lack of significance of this regulation may be a harsh judgement, particularly as breeders in horticulture and floriculture industries have applied for PBRs. However, it is necessary to recognise the other means of controlling innovation and the movement of plant varieties in these sectors. For instance, in the floriculture sector, various forms of informal self-organisation have led to low levels of defaulting on royalty payment (Interview, Ornamentals' Breeder). Equally important has

⁵¹ Minot and Ngigi (2004) recognise that some of these institutional arrangements, such as contract farming, are not without their problems.

⁵² Concern within government circles has led to some changes with the national research system seeking to make notable interventions as witnessed by the breeding of novel flower varieties (Interview, Policy Researcher). A relevant example here is the KARI-bred Moby Dick (*Aesclepias* sps) that is suitable for smallholder cultivation.

been the control exercised at all stages of the supply chain. Not only is there strong surveillance at early stages of the supply chain, but also the limited outlets towards the retail end (e.g. flower auctions in the Netherlands and few large buyers) allow relatively easy detection of the misappropriation of a variety.

The 'success' of these sectors has also been queried in the literature⁵³. For example, McCulloch and Ota (2002) investigate the poverty alleviation impacts of these sectors. The presumption being that employment effects will be mediated through two effects with production being located in rural areas and post-production activities (e.g. pack-houses) being located in urban areas. In the early 1990s it was estimated that over half of fresh fruit and vegetable exports originated in smallholdings (Jaffee, 1995). However, Jaffee's (2003) later work notes a squeezing of smallholders as they now account for 27% of fresh vegetables and 85% of fresh fruits. Purchaser demands for quality, traceability and other food standards being a factor in this transformation. Consolidation in the flower industry is more severe and has increased in recent years (Interview, Policy Researcher). While there are some 500+ operators, approximately 75% of cut flowers are grown and exported by two-dozen large and medium operators (Collinson, 2001). Recent data suggests that 97% of flower exports originate in medium to large plantations⁵⁴. Noting some of this evidence, Minot and Ngigi (2004, p20-22) are concerned that the expanding role of supermarkets and lack of quality control will adversely affect the participation of smallholders. This is further complicated by the

⁵³ The discussion here does no justice to the points raised in the literature but seeks to draw attention to aspects of the 'successes'.

⁵⁴ Large-scale plantations are in excess of 50 hectares and employ between 1000 – 2000 workers whilst medium scale plantations are in the 10 – 40 hectares range and employ between 500 – 1000 workers (Interview, Policy Researcher).

high capital intensity of floriculture (est. costs are at K£50,000 per hectare) and difficulties for new entrants to get access to flower varieties.

Other aspects of this 'success' raise important questions in the terms of understanding the underlying drivers and in reflecting on the future sustainability of the sector. For instance, the 'hidden costs' of adverse environmental spillovers and the use of hazardous chemicals has bothered the floriculture industry for some time. The Kenyan Human Rights Commission organised a conference in February 2002 to address issues like this (FAO, 2002). In the Lake Naivasha Cluster evidence exists of adverse environmental impact (e.g. loss of hippo population) and 'plantation-like' labour standards. There has been an agreement to phase out and ban the use of chemicals like methyl bromide. The Kenyan Flower Council, established less than a decade ago in 1997, has evolved codes of best practice that include aspects of worker condition and environmental practice (Collinson, 2001). Collinson (ibid.) observes that even while the code does not either specify what a 'living wage' is nor prescribes a minimum wage most flower companies pay three to four times the legislated minimum wage. Though promising, others note that the linkage between export-oriented agri-based industries and poverty reduction has not been robustly researched (McCulloch & Ota, 2002). Conducting a sample survey simulation, McCulloch and Ota (ibid.) found that horticultural households are in general, better off than non-horticultural households in urban and rural areas. For example, in rural areas, there are improvements in the economic situation of a variety of households either through employment – particularly women for whom few alternative options exist – and for smallholders who produce for this sector. Yet, the authors urge caution in interpreting their results. Beyond the usual concerns about data accuracy, they remind readers that claims about causality remain unresolved: "... we cannot be sure whether the higher incomes of horticultural

households are as a result of their participation in the industry or whether their participation in the industry is as a result of having characteristics associated with higher incomes” (McCulloch and Ota, 2002, p30). Not dissimilar are observations in Minot and Ngigi (2004) who establish the higher profitability of horticultural production, but suggest that there may be a self-selection bias: “it may be that households that have good market access are more likely to grow fruits and vegetables and have higher incomes for other reasons, such as off-farm employment” (Minot and Ngigi, 2004, p48). Thus, concluding that higher incomes and participation are correlated without any strong influences between the two. Beyond these observations, it is surprising that none of the studies have examined the distribution of value across the supply chain and whether the export revenues earned in the sector are retained within Kenya⁵⁵. This remains an equally crucial aspect of the *success* and *sustainability* of the sector.

4.3 *The Impact on the Public Sector*

The strong presence of the public sector in Kenya makes it important to examine how it evolves to changes in the landscape of IPRs – and wider currents of liberalisation. The introduction of PBRs, in specific, and IPRs, in general, presents a variety of policy options. Recalling the discussion in section 2.4 regarding KARI finances, revenue generation through IPRs may make-up for the continued shortfall in funds from the public exchequer whilst also diminishing some of the pressures of donor-based project-linked funds. This strategy of using IPRs for revenue generation is not unique to Kenya. It appears to be a pattern pioneered in the global North (e.g. the Bahy-Dole Act in the

⁵⁵ An exception is Maharaj and Dorren (1994); however, without robust data analysis the claims of a drain of resources remain unconvincing.

US) and equally favoured elsewhere in the Global South⁵⁶. The changing IP landscape also presents opportunities for technology transfer that could allow for improved access to potential domestication of externally generated novel technologies. To explain, the introduction of IPRs promotes a 'market for knowledge'; thus, enabling different actors to transact in knowledge. On the other hand, the mere fact that the public sector seeks IPRs would appear to be a fundamental contradiction. That said, a strong case is often made for the public sector use of IPRs in a defensive mode to keep technologies in the public domain and prevent misappropriation of publicly generated technologies. Both these factors are well appreciated by KARI scientists (Interview, Public Sector Breeders). Yet, concerns remain on how incentives generated by IPRs and cost-recovery/revenue-generation may transform and skew breeding objectives. Further, the IP policy adopted by KARI, particularly its policy on licensing its varieties, will have substantial influence on the viability of many seed companies; thus, shaping the competitive environment of the industry. Clearly, it is not easy to negotiate these different factors and a possibility for some conflicting outcome exists. Evidence indicates a growing constriction in the flow of technologies. A five country Latin American study concludes that access to germplasm was significantly restricted after the implementation of PBRs (Jaffee and van Wijk, 1995). The transformations that take place are subtle and follow multiple pathways involving public institutions behaving like 'semiprivate organisations' and collaborative ventures between the public and the private leading to exclusive clubs that do not allow external flows of technologies. No doubt, public agricultural research will have to undergo a radical transformation in an era marked by the increasing presence of the private sector (Rangnekar, 2004).

⁵⁶ Here, consider India's *Protection of Plant Varieties and Farmers' Rights Act* that allows for public breeders to seek plant breeders' rights for their varieties.

At the time of research, KARI was in the process of preparing its IP policy. There are indications of a tension and difference of approach between the group of lawyers and breeders in the biotech department (Interview, Public Sector Breeders). While Louwaars et al. (2005, p102) note the difficult issue of resolving how varieties will be licensed; many of these varieties have already been protected. As such, the amnesty to extant varieties that led to the increase in applications in 2001 was indicative of a move for an assertive use of IPRs. Delloite and Touche Consulting (1997)⁵⁷ were commissioned to review revenue-generating options and estimated a possible income stream that would contribute around 8% of KARI's operating income. KARI has acted on this study by initially terminating the exclusive license that KSC had to its varieties in 1995 and later setting up KARI Seeds Unit in 1997. KARI's *Strategic Plan 2005-2015* (KARI, 2005, p29) spells out the broad mandate for the Seeds Unit: "KARI intends to expand this operation, not only to generate revenue, but also to promote her new technologies. In addition, KARI is making concerted efforts to raise revenue through royalties from its technologies. KARI has also signed license agreements with several commercial companies to commercialise its varieties and remit royalties to the Institute at an agreed percentage of sales".

Caution needs to be sounded on this proposed route and to this extent, KARI breeders acknowledge competing policy objectives (Interview, Public Sector Breeders).

Expressed concerns reflect an awareness that the incentives structure presented to breeders now includes a *desire* for cost-recovery through PBRs. This may skew the breeding effort in the direction of more lucrative crops and agro-economic conditions;

⁵⁷ Delloite and Touche Consulting, 1997, *KARI Revenue-Generating Strategic Review*, Overseas Development Administration contract reference: cntr 96 1193A. Final Report, Nairobi: KARI. Cited in Ndi and Byerlee (2004).

thus, aggravating the situations amongst orphan crops and neglected agro-economic conditions. Even while accepting the route of using PBRs as a revenue generator, KARI has to decide on its licensing policy. Exclusive licenses would tend to offer higher revenues for a particular variety whereas non-exclusive licenses would allow for wider diffusion. These options map out some of the dilemmas between a public mandate and revenue generation within a public institution. Louwaars et al. (2005, p102) note that with KARI administrators favouring non-exclusive licenses, it lost out the opportunity of clinching a deal with one of its hybrid maize varieties.

The use of IPRs is also fraught with other problems. The ad hoc approach at granting amnesty to extant varieties to allow the public sector to secure their rights has been problematic. To begin, KSC has raised questions concerning the status of its pre-existing exclusive license. Some seed companies have contested these applications on the ground that subsequent granting of rights will jeopardise existing seed multiplication. These ownership questions aside, the costs to be incurred in *protecting* rights must be factored into the equation. Louwaars et al. (2005, p86) observe that the initial euphoria in securing rights in public varieties may not be an intelligent economic decision. The high investment in protecting such a range of varieties – many of which may remain on the shelf – could be a drain on public funds. For instance, of the 16 maize varieties that KARI offered in 2004, only three were contracted (Louwaars et al., 2005, p105).

A final point for consideration is the deeper and more substantive impact that public sector PBRs (and licensing policy) has on the competitive structure of the seed industry. Earlier in section 2 it was noted that apart from a few companies, most local (maize) seed companies have nascent breeding capacity, if at all; thus, they are significantly dependent on publicly bred germplasm. In a perverse way, the exclusive

license that KSC had to KARI material has been a key element in its continued dominance in the maize seed market (Waiyaki et al., 2005)⁵⁸. The existing non-competitive nature of the maize seed market has generated wide policy interest. Symptomatic of the problem are the substantially high seed/grain ratio in Kenya, 4.5, compared to Zimbabwe, 1.7. Without any regulation on seed prices, profits seem to be substantial with estimates of 20% for KSC and 10-20% for private seed companies. The relatively high price of seed is said to be a key deterrent by farmers⁵⁹. No doubt, other factors like the price of associated inputs, particularly fertilisers, also play an important role in deterring farmers from purchasing new seeds. Thus, in recent years there has been a significant fall in the use of certified seeds. Waiyaki et al. (op. cit.) end their study with a number of recommendations, two of which are centrally relevant:

- Public sector seed companies are restructured to lower overhead costs and reduce profit margins. A 'cap' on profits at a 15% (max) would reduce seed prices by 20%.
- Maize varieties developed in the public sector are made available to all interested parties through a simple and transparent bidding process with non-exclusive licenses.

Decisions taken on these multiple aspects of public sector IP policy have grave and dynamic consequences for the seed industry, in general, and the broader viability of local plant breeding, in particular.

⁵⁸ The remainder of the paragraph is based on Waiyaki et al. (op. cit.).

⁵⁹ Aggravated by the relatively high seeding rate in Kenya.

5 CONCLUSION

The review of Kenya's experience in plant variety protection presents useful observations and lessons. Some of the key observations in sections 3 and 4 are noted here. To begin, well before the TRIPs Agreement, Kenya had the essential framework for the *sui generis* protection of plant varieties. Though, the key regulation, the *Seeds and Plant Varieties (Plant Breeders' Rights) Regulation* was only enacted in 1994. This, as the research demonstrates, was a reflection of the demands made by expatriate and foreign breeders in horticulture and floriculture. This demand also saw Kenya seek UPOV accession. In deciding to accede to UPOV, Kenya had to make several important amendments to their PBRs law. In particular, it had to remove a condition for grant of protection that required demonstration of agroecological value. Hence, our conclusion that Kenya's domestic legal architecture has closely mimicked the European system with its exemption of plant varieties from patents and the elaboration of a *sui generis* system for plant varieties. Remarkably, we also find that the substantive domestic law has failed to translate any of the positions Kenya has adopted at the TRIPs Council. Thus, its rhetoric and morale leadership of the 'no patents on life' position in Geneva seems to be at odds with the legal system it has put in place at Nairobi. The study also draws attention to deeper problems with the legal framework. To begin, there are legal ambiguities in the scripting of the exemption for plant varieties in the *Industrial Property Act, 2001*. Second, there have been long delays in setting up and making operational the institutions to administer the laws. For example, the *Seeds and Plant Varieties Tribunal* was only set up in September 2006.

Our economic analysis proceeded with some qualifiers based on the limited time frame and data that was made available. While some commentators have looked at the number of applications as an unambiguous indicator of 'investment' in the system, the

evidence is not so convincing. At best, we may claim that applicants have *confidence* in the system and are willing to invest in seeking protection. Using applications, it is possible to comment on the emergent socio-technical division of labour in plant breeding. Domestic plant breeders exclusively focus on cereals, food crops and plantation crops whereas foreign breeders focus exclusively on horticulture and floriculture crops. As such, setting up the PBRs system has not been followed by investments in a wide range of crops that are more directly linked to food security. Some scepticism is also raised about the role that PBRs have played in enabling the growth of the horticulture and floriculture sectors. Apart from a range of drivers that enabled this growth, the study also underlines the non-IP mechanisms that have been adopted to control the diffusion of innovations in these sectors. That said, the large number of PBRs applications from this sector indicates some role and usefulness. Following a more global logic of the public sector using IPRs, KARI has looked at PBRs as a cost-recovery and revenue-generating opportunity. Our research draws attention to inherent conflicts in this policy and the potential of skewing the incentives faced by public sector breeders; thus, disturbing the public mandate. A key element for KARI to resolve, as it proceeds along this policy is its licensing approach. Exclusive licenses would further aggravate the oligopolist structure of the maize seed market. In particular, many local seed companies, in particular new entrants, are dependent on publicly bred germplasm for their viability. Non-exclusive licenses will allow them to flourish; thus, promoting a diversity of technology suppliers and a competitive seed market.

Presently, Kenya is now deliberating on strengthening PBRs and acceding to the 1991 Act of UPOV. This is a substantial change that demands wide public debate and detailed analysis. This study – along with other studies of PBRs (esp., Louwaars et al., 2005) – makes a strong case for closely reviewing the deeper economic

transformations that are taking place. To begin, strengthening of rights does not automatically translate into increased (and useful) plant breeding. Presently, with the public sector remaining the dominant breeder of cereals, plantation and other food crops, the rationale behind strengthening PBRs is absent. With a limited role for PBRs in the horticulture and floriculture sectors, any demand from this sector should be considered with caution. A key factor to analyse would be the impact on the market for seeds. The maize seed market is already dominated by KSC and most local seed companies remain dependent on publicly bred germplasm. With a very high seed/grain ratio, the price of hybrid maize seed is high in Kenya. All these indicators do not bode well for the stagnant productivity of maize.

There are good legal and technical reasons to review the decision to accede to the 1991 Act of UPOV. The delay in setting up key administrative bodies suggests an institutional deficit in the system. Strengthening the rights will need swifter action on litigation, which is likely to increase. More importantly, there are technical aspects of the 1991 Act, such as the issue of essentially derived varieties, that is neither easy to determine nor easy to administer. All said and done, there is wisdom in adequately studying the 'impacts' of the current system before strengthening rights. It is never easy to retrench (intellectual property) rights once they have been granted in today's world.

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7 APPENDIX ONE: LIST OF INTERVIEWS

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