

PLANT VARIETY PROTECTION IN AFRICA: TOWARDS COMPLIANCE WITH THE TRIPS AGREEMENT

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INTRODUCTION

Plant variety protection has come to the fore in the wake of the adoption of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement). TRIPS generally imposes the patentability of inventions, whether products or processes, in all fields of technology and specifically mandates the introduction of a form of legal protection on plant varieties. Article 27.3(b) thus states that member states “shall provide for the protection of plant varieties either by patents or by an effective *sui generis* system or by any combination thereof.”¹

The introduction of plant variety protection in African countries is a novelty for all but a few states. It constitutes a significant departure from previous practice which generally emphasized the free sharing of knowledge at all levels. The challenge is further compounded by the fact that plant variety protection has until now only been introduced in countries with relatively small but highly industrialized agricultural sectors. African countries, like other developing countries in the same situation, must thus innovate in this field. Some of the problems they have encountered on the road to developing plant variety protection regimes have been the time pressure forced upon them by TRIPS implementation deadlines and the pressure brought upon them to adopt an existing plant variety protection regime developed mainly for OECD countries.

African countries have generally been slow in taking up the challenge of devising plant variety protection, partly because of the prevalence of more urgent issues requiring their attention. Further, all the least developed countries in the region have until 2006 to implement their obligations. Given this background, this article analyses developments in India where significant debates have taken place concerning the introduction of plant variety protection. The Indian situation is rich in lessons for African countries because there are significant similarities in their agricultural sectors, because the debate in India predates the signature of the TRIPS Agreement, and because there has been a comparatively strong input from the civil society into the debate on the introduction of intellectual property rights in agriculture.

This article focuses on the implementation of plant variety protection as part of the obligations that African states have to undertake under TRIPS. It does not debate whether the introduction of plant variety protection is warranted. In

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¹ Agreement on Trade-Related Aspects of Intellectual Property Rights, in General Agreement on Tariffs and Trade: Multilateral Trade Negotiations Final Act Embodying the Results of the Uruguay Round of Trade Negotiations, Annex 1C, Marrakesh, 15 April, 1994, reprinted in 33 *Int'l Legal Mat.* 1125 (1994) [hereafter TRIPS Agreement].

principle, sharing knowledge seems to be most appropriate to agricultural management in most sub-Saharan countries. However, it is necessary to analyse the situation brought about by TRIPS and the need for African states to fulfil their obligations under this treaty. This article argues that African states should take advantage of the opportunity they have to devise a property rights system adapted to their needs and conditions and they should avoid any system involving the introduction of monopoly or exclusionary rights, such as patents or plant breeders' rights. This is due to the fact that the introduction of such rights in agriculture does not seem to provide the conditions necessary to ensure the fulfilment of basic food needs for all individuals and the sustainable management of biological resources in African countries.

LEGAL AND INSTITUTIONAL FRAMEWORK

Plant variety protection through intellectual property rights has been a contentious issue for a long time and plant varieties were traditionally excluded from patentability at the international level. Some countries and regions progressively introduced plant variety protection in the course of the twentieth century, but it was generally felt that granting patents was not appropriate in this field.² Recent developments in the context of the World Trade Organization (WTO) have heralded a major shift towards the imposition of plant variety protection in most countries of the world. This section highlights the main international treaties and policies relevant in the field of plant variety protection and identifies some of the initiatives taken in Africa at the regional and domestic levels towards the setting up of plant variety protection regimes.

Property rights over plant varieties at the international level

The international regime concerning the protection of plant varieties has evolved significantly over the past few decades. Before turning to the main treaties and institutions dealing with these issues, a few general remarks are in order. First, the regime is marked by a variety of instruments whose subject matter may differ. Thus, while the Convention on Biological Diversity (CBD) covers all biological resources, the International Undertaking on Plant Genetic Resources (International Undertaking) is only concerned with plant genetic resources. Second, the different treaties belong to different areas of international law, such as environmental law and trade law. While there is theoretically no hierarchy between these various fields, in practice, WTO-related instruments carry more weight than environmental treaties because of the threat of sanctions. Third, the property rights regimes set up in the different instruments do not necessarily add up to form a coherent whole. Indeed, while one can identify a trend towards the privatization of plant genetic resources over the past two decades, one also finds a continuous emphasis on the sovereign rights of states over their natural resources generally.

² On the development of plant variety protection in the US and Europe, see generally G. Van Overwalle, "Patent protection for plants: A comparison of American and European approaches", 39 *IDEA: J.L. & Tech.* 143 (1999).

The TRIPS Agreement

The TRIPS Agreement generally provides for the introduction of intellectual property standards already in place in most OECD countries to all WTO member states. In the field of patents, it requires that patents should be available for inventions in all fields of technology. It also specifically requires the introduction of plant variety protection but does not impose their protection through patents. Indeed, article 27.3(b) specifically allows member states to devise alternative property rights systems to implement their obligations in this field. This reflects debates concerning the appropriateness of imposing patents on plant varieties, and constitutes one of the relatively few cases in the TRIPS Agreement where states have a certain margin of appreciation in implementing their obligations.³ TRIPS constitutes the trigger for the development of plant variety protection legislation in most African countries, but does not provide precise guidance concerning possible alternative property rights systems that can be developed.

Article 27.3(b) is significant in the context of TRIPS. First, while it imposes the introduction of plant variety protection, it does not force member states to introduce patents. Second, article 27.3(b) is in effect a differential provision which is meant to accommodate developing countries' needs since it provides an exception to the general rule under article 27.1 requiring patentability in all fields. Indeed, while most OECD countries had adopted some form of plant variety protection before 1994, most developing countries had not. Third, the *sui generis* option offered in the case of plant varieties could be a model for a number of other areas, particularly in pharmaceuticals, where there is growing dissatisfaction in a number of countries with the regime proposed in TRIPS at the moment.

The International Convention for the Protection of New Varieties of Plants

The International Convention for the Protection of New Varieties of Plants (UPOV) is the only international treaty focusing on plant variety protection. It was first adopted in 1961 by a group of Western European nations with the specific aim of introducing private property rights on plant varieties.⁴ This followed pressure from the private sector, which argued that the lack of intellectual property rights in this field threatened their development. It was, however, felt at the time that the introduction of patents in agriculture would be inappropriate due to the prevalent practices of free exchange of seeds and knowledge among farmers.⁵

Even though UPOV did not introduce patents, it sought from the outset to provide incentives to the private sector to engage in commercial plant breeding through the provision of plant breeders' rights. More specifically, the Convention recognizes the rights of individual plant breeders who have developed or discovered plant varieties which are new, distinct, uniform and stable. On the other hand, the Convention recognizes what is known as the farmer's privilege.

³ See, e.g., D. Gervais, *The TRIPS Agreement—Drafting, History and Analysis* (London, 1998). The TRIPS Agreement provides for other exceptions to patentability at arts. 27.2 and 27.3.

⁴ International Convention for the Protection of New Varieties of Plants, Paris, 2 December, 1961, as revised at Geneva on 10 November, 1972, 23 October, 1978, and 19 March, 1991 (Geneva: UPOV, UPOV Doc. 221(E), 1996).

⁵ See, e.g., J.-P. Clavier, *Les catégories de la propriété intellectuelle à l'épreuve des créations génétiques* (Paris, 1998).

Thus, under the 1978 version of the Convention, farmers are permitted to re-use propagating material from the previous year's harvest and can freely exchange seeds of protected varieties with other farmers. Plant breeders are also allowed to use the protected variety in order to breed and commercialize other new varieties.

The latest revision of the Convention adopted in 1991 has further strengthened the rights of commercial plant breeders. This includes the obligation for member states to provide protection to all plant genera and species. Further, it extends breeders' rights to all seed production of a protected variety even though states can decide otherwise at the national level. In some cases, it also grants commercial breeders rights to the harvested material of the variety and extends the protection to varieties that are "essentially derived" from a protected variety. Overall, in the 1991 version, plant breeders' rights have become akin to weakened patents and the conceptual distinction between the two is now blurred.

Membership of the UPOV Convention has grown over time but until recently it consisted mainly of developed countries. Only a few developing countries, mainly from Latin America, have joined the UPOV,⁶ but its influence is more prevalent than a strict head count of member states would suggest, since a number of countries have adopted or are in the process of adopting legislations based on the UPOV model. Over the past few years, there has been significant pressure on developing countries to adopt UPOV as a *sui generis* plant variety protection system. Nothing in the TRIPS Agreement implies that UPOV is an alternative to patent rights. Indeed, UPOV provides weaker monopoly rights than patents but plant breeders' rights are based on exactly the same premises. Further, given that countries can now only join the 1991 version of the Convention, which has significantly weakened the exceptions to the rights of breeders contained in the 1978 version, there is no significant difference between patents and the regime offered by UPOV.

The International Undertaking on Plant Genetic Resources

The International Undertaking was adopted by the FAO Conference as a non-binding instrument.⁷ It affirms the principle that plant genetic resources are a heritage of humankind that should be made available without restriction to anyone. This covers not only traditional cultivars and wild species but also varieties developed by scientists in laboratories. This encompassing conception of access proved to be unacceptable to some developed countries. Broader acceptance of the International Undertaking was only achieved after interpretative resolutions were adopted. These resolutions affirm the sovereign rights of countries over their plant genetic resources and qualify the principle of free availability by recognizing plant breeders' rights and farmers' rights.⁸ This recognition of private property rights implies the right to compensation for access to biological resources and associated products.⁹

⁶ In Africa, only South Africa and Kenya are members.

⁷ International Undertaking for Plant Genetic Resource, Res. 8/83, *Report of the Conference of EAO*, 22nd Sess., Rome 5–23 November, 1983, Doc. C83/REP.

⁸ Agreed Interpretation of the International Undertaking, Res. 4/89, *Report of the Conference of EAO*, 25th Sess., Rome 11–29 November, 1989, Doc. C89/REP.

⁹ See, e.g., Revision of the International Undertaking, Mandate, Context, Background and Proposed Process, Commission on Plant Genetic Resources, First Extraordinary Sess., Rome, 7–11 November, 1994, Doc. CPGR-Ex1/94/3.

Further revision of the International Undertaking has been prompted by the growing importance of biological resources at the international level and the coming into force of the CBD, which raised the need to harmonize relevant provisions of the two regimes.¹⁰ Some of the most contentious issues in the negotiations have been the drafting of the provision on access to biological resources and on farmers' rights. The draft article on farmers' rights focuses on the protection of traditional knowledge, the equitable sharing of benefits arising from the exploitation of biological resources and the right to participate in decision-making.¹¹ It emphasizes mainly the farmers' contribution to agricultural management and not their entitlements. The draft text also introduces a multilateral system to facilitate access to genetic resources and to foster the sharing of benefits arising from their utilization. It recognizes, for instance, that no monopoly right will be sought by recipients of resources received under this multilateral system.

The Convention on Biological Diversity

The CBD does not deal specifically with the issue of plant variety protection but is of direct relevance to the setting up of protection regimes for plant varieties since its scope encompasses all biological resources. Generally, it constitutes the central instrument concerning biodiversity at the international level. In this context, it broadly delimits the rights of states and other relevant actors over biological resources. It generally affirms the sovereign rights of states to exploit their own resources pursuant to their own environmental policies, a direct reflection of the principle of permanent sovereignty over natural resources.¹² The sovereign rights of states over their biological resources are limited by the recognition that these resources are a common concern of humankind.

The Convention also provides a broad framework for member states' policies concerning access, development and transfer of technologies. Further, it acknowledges the necessity for all parties to recognize and protect intellectual property rights in this field. The Convention further recognizes both the dependence of local communities on biological resources and the roles that these communities play in the conservation and sustainable use of the resources. It points to the need for equitable sharing of benefits arising from the use of their traditional knowledge, innovations and practices, relevant to the conservation of biodiversity and the sustainable use of its components.¹³

The introduction of plant variety protection in the context of the TRIPS Agreement cannot be dissociated from the CBD. Indeed, the Convention provides the broad framework within which property rights over plant varieties must fit. Further, it is, for instance, impossible to conceive a plant variety protection regime separately from the property rights system to be devised concerning traditional knowledge. While the two issues do not fully overlap, there are significant commonalities.

¹⁰ Res. 7/93, Revision of the International Undertaking on Plant Genetic Resources, *Report of the Conference of the FAO*, 27th Sess., Rome 6–24 November, 1993, Doc. C93/REP.

¹¹ Composite Draft Text of the International Undertaking on Plant Genetic Resources, Commission on Genetic Resources for Food and Agriculture, Third Inter-sessional Meeting of the Contact Group, 2000, Doc. CGRFA/CG-3/00/2.

¹² See art. 3 of the Convention on Biological Diversity, Rio de Janeiro, 5 June, 1992, reprinted in 31 *Int'l Legal Mat.* 818 (1992) [hereafter CBD].

¹³ See Preamble §12 and art. 8(j) of the CBD, above, n. 12.

The Consultative Group on International Agricultural Research

The Consultative Group on International Agricultural Research (CGIAR) is an important player in the management of genetic resources used to meet food needs. It holds significant *ex situ* germplasm collections which represent about 40 per cent of unique food crop germplasm.¹⁴ The *ex situ* collections held by the various International Agricultural Research Centres (IARCs) have traditionally been freely accessible.¹⁵ In a changing international environment characterized by the progressive move towards the establishment of sovereign and private property rights over biological resources, the CGIAR has had to rethink its position with regard to property rights, in particular intellectual property rights.¹⁶ The new guiding principles on intellectual property seek to harmonize the CGIAR's core principles that the designated germplasm it holds is held in trust for the world community with the recognition of various forms of property rights, including sovereign rights, farmers' rights and private rights.¹⁷ In principle, the Centres neither apply intellectual property protection to their designated germplasm nor do they require recipients to observe the same conditions. The Centres also refrain from asserting intellectual property rights over the products of their research. An exception to this rule is made in case the assertion of intellectual property rights may facilitate the transfer of technology or otherwise protect developing countries' interests. The CGIAR also requires that any intellectual property rights on the Centres' output will be assigned to the Centre and not to an individual. While the guiding principles generally seek to contain to some extent the monopoly elements of intellectual property rights such as patents, plant breeders' rights are specifically welcomed. Recipients of germplasm can apply for plant breeders' rights as long as this does not prevent others from using the original materials in their own breeding programmes.

Developments in Africa

The obligation to introduce plant variety protection as required by the TRIPS Agreement has elicited attention from African countries. However, the development of alternatives to monopoly rights has not been given much prominence. While least developed countries still have several years to implement their TRIPS obligations and can use the coming five years to devise regimes adapted to their needs and conditions, other countries had to implement their obligations by 1 January, 2000. It is striking that, to date, the most common response throughout the continent has been to accept the UPOV Convention as a form of plant variety protection instead of devising an alternative to monopoly rights.

¹⁴ Gigi Manicad, "CGIAR and the private sector: public good versus proprietary technology in agricultural research", 37 *Biotechnology & Dev. Monitor* 8 (1999).

¹⁵ See, e.g., Agreement Between the IPGRI/INIBAP and the FAO Placing Collections of Plant Germplasm Under the Auspices of FAO, 26 Oct., 1994.

¹⁶ Consultative Group on International Agricultural Research, Progress Report on IPR Matters and Proposal for Review of Plant Breeding, Mid-Term Meeting, 1999, Beijing, CGIAR Doc. MTM/99/20.

¹⁷ See Consultative Group on International Agricultural Research, CGIAR Center Statements on Genetic Resources, Intellectual Property Rights, and Biotechnology (1999).

Regional frameworks

Of the two regional intellectual property organizations, only the French-speaking African Intellectual Property Organization (OAPI) has dealt with plant variety protection directly. OAPI member states agreed to a revision of the Bangui Convention in 1999. The new text commits them to adhere to the 1991 version of the UPOV Convention.¹⁸ This constitutes an unexpected choice for two reasons. A majority of OAPI member states fall in the least developed country grouping, which does not have to implement their WTO obligations until 2006. They could thus have given themselves another six years to devise their own plant variety protection legislation. Further, there was not only no obligation to join UPOV to fulfil the requirements of article 27.3(b) of the TRIPS Agreement, but also no obligation to join the more stringent UPOV 1991. It is striking that the only limits placed on monopoly rights on plant varieties in the convention are found in a provision denying patentability on plant varieties, animal species and essentially biological processes for the breeding of plants and animals.¹⁹ While member states only commit themselves to joining UPOV in the future, the Convention already provides a plant variety protection regime which has been found to be in conformity with the 1991 version of the convention by the UPOV Council.²⁰

Member states of the African Regional Industrial Property Organization (ARIPO) have not dealt specifically with the issue of plant variety protection following the adoption of the TRIPS Agreement. Further, the current patent regime put in place by the Protocol on patents does not offer useful guidance. Indeed, the Protocol does not provide for any substantive restriction to patenting.²¹ ARIPO leaves member states free to reject patents granted on grounds found in domestic law but does not itself provide any framework within which patentability must fall. ARIPO examines whether the criteria of novelty, inventiveness and industrial applicability are met. There are no other conditions to be met.

The only regional effort at defining a regime concerning biological resources is the model legislation developed in the context of the Organization of African States (OAU).²² The model law deals with access to biological resources, benefit sharing, and the rights of farmers and breeders over their knowledge and resources. It is premised on the rejection of patents of life or the exclusive appropriation of any life form, including derivatives. Its provisions on access to biological resources make it clear that the recipients of biological resources or related knowledge cannot apply for any intellectual property right of exclusionary nature. The model law focuses mainly on the definition of the rights of communities, farmers and breeders. Community rights recognized include rights

¹⁸ See Agreement to Revise the Bangui Agreement on the Creation of an African Intellectual Property Organization of 2 March, 1977, Bangui, 24 February, 1999 [hereafter Bangui Agreement].

¹⁹ See Annex 1 of the Bangui Agreement, above, n. 18.

²⁰ See Annex 10 of the Bangui Agreement, above, n. 18, and International Union for the Protection of New Varieties of Plants, Examination of the Conformity of the Bangui Agreement on the Creation of an African Intellectual Property Organization with the UPOV Convention, UPOV Council, Seventeenth Extraordinary Session, Geneva, 7 April, 2000, Doc. C(Extr.)/17/3.

²¹ See Protocol on Patents and Industrial Designs Within the Framework of the African Regional Industrial Property Organization, Harare, 2 December, 1982.

²² See African Model Legislation for the Protection of the Rights of Local Communities, Farmers and Breeders, and for the Regulation of Access to Biological Resources (2000) [hereafter African Model Legislation].

over their biological resources and the right to collectively benefit from their use, rights to their innovations, practices, knowledge and technology and the right to collectively benefit from their utilization. In practice, these rights allow communities the right to prohibit access to their resources and knowledge, but only in cases where access would be detrimental to the integrity of their natural or cultural heritage.²³ Further, the state is to ensure that at least fifty per cent of the benefits derived from the utilization of their resources or knowledge is channelled back to the communities. The rights of farmers are slightly more precisely defined. These include the protection of their traditional knowledge relevant to plant and animal genetic resources, the right to an equitable share of benefits arising from the use of plant and animal genetic resources, the right to participate in making decisions on matters related to the conservation and sustainable use of plant and animal genetic resources, the right to save, use, exchange and sell farm-saved seed or propagating material, and the right to use a commercial breeder's variety to develop other varieties. The breeders' rights defined under the model law generally follow the definition given in the UPOV Convention and the duration of the rights is, for instance, modelled after UPOV 1991. The noteworthy characteristic of the plant breeders' rights regime under the model law is the rather broad scope of the exemptions granted. Exemptions to the rights of breeders include the right to use a protected variety for purposes other than commerce, the right to sell plant or propagating material as food, the right to sell within the place where the variety is grown and the use of the variety as an initial source of variation for developing another variety.²⁴

Domestic frameworks

Generally, only a few African countries have already implemented plant variety protection regimes in conformity with their TRIPS obligations. The 24 countries that are classified as least developed countries do not have to implement their TRIPS obligations until 2006. However, other countries should have put legislations in place by 1 January, 2000. Some countries, such as Kenya, South Africa and Zimbabwe had introduced plant variety protection regimes before the adoption of the TRIPS Agreement, but these countries constitute exceptions. Most other countries did not have plant variety protection regimes in place before 1995. Further, some of them, such as Tanzania, specifically excluded patentability for plant varieties.²⁵ Even in cases where plant breeders' rights are being introduced, exclusions to patentability remain in favour. In Kenya, the proposed amendments to the Industrial Property Bill specifically reject the patentability of plant varieties even though it provides that parts of plant varieties and products of biotechnological processes are patentable.²⁶ It is significant that the rejection of patents on plant varieties is not akin to a rejection of monopoly rights in general on plant varieties.

Among the countries that had to implement plant variety protection regimes by 1 January, 2000, progress has generally been slow in drafting and implementing legislation, and the deadline has passed with most still in the process of adopting the necessary regimes. Kenya, however, has been an exception to this trend

²³ Art. 20 of the African Model Legislation, above, n. 22.

²⁴ Art. 43 of the African Model Legislation, above, n. 22.

²⁵ S. 7 of the Tanzanian Patents Act, 1987.

²⁶ See s. 26 of the Kenyan Industrial Property Bill, 2000.

through its decision to ratify the 1978 version of the UPOV Convention in early 1999. Further, Kenya had already introduced plant variety protection in 1972 as part of the Seeds and Plant Varieties Act.²⁷ The Act focused both on the regulation of the production, testing, certification and marketing of seeds and on the introduction of plant breeders' rights. The plant variety regime was modelled after the UPOV Convention and included, for instance, the same conditions for the granting of plant breeders' rights, namely the criteria of distinctiveness, uniformity and stability.²⁸ The rights were granted for a period of up to 25 years and gave the breeders exclusive rights to produce the propagating material of the variety for commercial purposes, to commercialize it, to offer it for sale or to export it.²⁹ Despite the existence of a plant variety protection regime on the books, the law was only implemented with regard to the certification of seeds.³⁰ It is only in 1994 that regulations were adopted which led to the establishment of a Plant Breeders' Rights Office. Given the prior existence of a plant variety protection regime based on UPOV 1961, Kenya's application for membership of UPOV 1978 has implied only minor legislative changes in the existing law.

While plant variety legislations constitute the central element of a plant variety protection regime at the domestic level, they are not the only relevant pieces of legislation. Indeed, in a number of cases, other biodiversity related laws also deal with property rights over biological resources and related knowledge. In a number of cases, these laws give pointers concerning property rights for actors other than formal breeders, which have been in most cases the focus of plant variety protection laws. Thus, the new Kenyan Act provides that the authority established under the Act is mandated to protect the indigenous property rights of local communities in respect of biological diversity.³¹ The Act also deals more generally with the management of genetic resources and specifies that this has to be done for the benefit of the people of Kenya. The draft regulations concerning access to genetic resources have interpreted this provision to imply that all plant genetic materials, in their natural condition or deposited in a gene bank, are vested in the Government of Kenya, which holds them in trust for present and future generations of Kenyans.³² Similarly, the draft Ugandan access and benefit-sharing regulations determine that the right to regulate access to biological resources is vested in the government for the benefit of the people.³³ While access and benefit-sharing regimes are not supposed to be related to the introduction of monopoly rights on plant varieties, in practice there is a very strong link. Indeed, the development of benefit-sharing schemes is often directly linked to the dichotomy between actors that benefit from entitlements and actors that do not benefit from property rights. In practice, the need for benefit sharing arises, for example, when commercial plant breeders get exclusive rights while

²⁷ Seeds and Plant Varieties Act, Laws of Kenya, cap. 326.

²⁸ See Fourth Schedule, Seeds and Plant Varieties Act, Laws of Kenya, cap. 326.

²⁹ Art. 20 of the Seeds and Plant Varieties Act, Laws of Kenya, cap 326.

³⁰ See World Trade Organization, *The Relationship Between the Convention on Biological Diversity (CBD) and the Agreement on the Trade-Related Aspects of Intellectual Property Rights (TRIPS): With a Focus on Article 27.3(b)*, WTO Doc. IP/C/W/175, 11 May, 2000.

³¹ S. 50 of the Kenyan Environmental Management and Co-ordination Act, 1999.

³² Art. 3.1 of the Kenyan Draft Environmental Management and Coordination Access to Plant Genetic Material Regulations, 1999.

³³ See Draft Ugandan National Environment (Access to Biological Resources and Benefit Sharing) Regulations, 2000.

farmers' varieties are held to be in the public domain. In this situation, benefit-sharing schemes are put in place as a form of compensation for the absence of property rights.

THE CASE FOR *SUI GENERIS* PLANT VARIETY PROTECTION SYSTEMS

The TRIPS Agreement gives member states the possibility to devise their own plant variety protection system. A number of conceptual and practical arguments militate in favour of this exception for most developing countries. This section first outlines why the introduction of monopoly rights such as patents or plant breeders' rights does not seem appropriate for most sub-Saharan countries in practice, and then focuses on some conceptual issues which also militate against the imposition of monopoly rights in agriculture. This provides the basis for the development of *sui generis* plant variety protection regimes.

Agricultural management and monopoly rights

Agriculture in Africa is an activity of primary importance. This is due to the fact that a majority of the population classified as economically active works in this sector and that agriculture remains an important economic activity. Aggregate figures do not necessarily reflect the full importance of this sector in most countries. Indeed, while in Libya only 7 per cent of the population is engaged in agriculture, the figure is above two-thirds in a number of sub-Saharan countries. Thus, 92 per cent of the population of Burkina Faso, 76 per cent of the population of Kenya and 74 per cent of Senegal's population find employment in the primary sector.³⁴ Further, agriculture's contribution to the GDP can be very substantial, reaching 26 per cent in Kenya, 32 per cent in Nigeria, 42 per cent in Cameroon and 50 per cent in Ethiopia.³⁵ Indeed, agriculture is, for instance, the most important economic sector in Kenya.³⁶ The importance of the primary sector is reinforced by the fact that a majority of the population of sub-Saharan countries lives in rural areas. Rural population accounts for 54 per cent in Senegal, 58 per cent in Nigeria, 74 per cent in Tanzania and 86 per cent in Uganda.³⁷

Seed management in African countries is largely carried out by farmers. Indeed, farm-saved seeds account for about 80 per cent of farmers' total seed requirements.³⁸ These proportions are even higher in some cases. Thus, in Ethiopia, farmers contribute about 96 per cent of the annual seed requirement, while in Tanzania only 2 per cent of the maize crop is planted with purchased certified seeds.³⁹ Further, even when farmers buy seeds for the crops they market, they usually continue to cultivate local food crops.⁴⁰ Traditionally, agricultural management has been built around significant sharing of knowledge and resources

³⁴ FAO, *FAO Yearbook—Production, Vol. 52, 1998* (Rome: FAO, 1999).

³⁵ United Nations Development Programme, *Human Development Report 2000* (New York, 2000).

³⁶ See, e.g., Central Bank of Kenya, *Monthly Economic Review* (Dec. 1999).

³⁷ United Nations Development Programme, above, n. 35.

³⁸ Kerry ten Kate and Sarah A. Laird, *The Commercial Use of Biodiversity—Access to Genetic Resources and Benefit-Sharing* (London, 1999).

³⁹ See, e.g., *Privatization of the Seed Industry in the West Asia and North African Region* (Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), 1997) and Esbern Friis-Hansen, "Tanzania's forgotten farmers", *Seedling* 6 (Dec. 1999).

⁴⁰ See E. Friis-Hansen, *The Socio-Economic Dynamics of Farmers' Management of Local Plant Genetic Resources* (Copenhagen: Centre for Development Research, 1999).

at all levels. This is, for instance, reflected today in the fact that African countries are highly dependent on genetic resources from other regions of the world for their main food crops. Indeed, the dependency ratio is generally high.⁴¹ Their position is not at all extraordinary since most countries of the world are highly dependent on genetic diversity from other areas for their main food crops.

The introduction of patents or monopoly rights in sub-Saharan African agriculture is difficult to analyse because the experience of OECD countries having introduced plant variety protection does not constitute an appropriate guide. This is due to the fact that present conditions in African agriculture differ markedly from the conditions in Europe when the UPOV convention was first adopted. Limited lessons can be learnt from the experience of Kenya and Zimbabwe, which already have plant variety protection regimes in place. In both cases, the introduction of plant variety protection has not substantially fostered the development of new food crops. On the contrary, in Kenya, out of 136 applications filed and tested since 1997, only one was a food crop while most concerned cash crops such as ornamentals or sugarcane and more than half concerned rose varieties.⁴² In Zimbabwe, data available for the period 1977 to 1999 shows that fewer than 40 per cent of the applications were for food crops.⁴³ Further, the introduction of plant breeders' rights does not seem to promote the development of indigenous research capacity. In Kenya, between 1997 and 1999, 91 per cent of the applications came from foreign institutions, while in South Africa 72 per cent of applicants in 1997 were foreign.⁴⁴

While there is only limited data to judge the impact of the introduction of monopoly rights in sub-Saharan Africa, a useful comparison can be made with the impact of the green revolution, for which substantial information is now available. African countries on the whole did not constitute a major focus of the green revolution, and one thus has to turn to the experience of Asian countries to understand its impact. The green revolution was in many respects similar to the introduction of genetically engineered seeds protected by monopoly rights today. It was meant to dramatically increase the yields of some of the staple crops in developing countries, and generally focused on the introduction of varieties requiring the application of a number of external inputs, from irrigation to large doses of chemical fertilizers and chemicals.

On the whole, green revolution areas witnessed significant yield increases.⁴⁵ However, despite these gains, the green revolution package has come under increasing criticism in the last decade.⁴⁶ First, while crop output has significantly increased in the short term, the green revolution has come to be associated with significant environmental costs. These include falling water tables due to the overuse of tubewells,⁴⁷ waterlogged and saline soils from many large irrigation schemes, declining soil fertility with excessive chemical fertilizer use and water

⁴¹ See generally, Ximena Flores Palacios/Commission on Genetic Resources for Food and Agriculture, Contribution to the Estimation of Countries' Interdependence in the Area of Plant Genetic Resources (Background Study Paper No. 7 Rev.1, 1997).

⁴² See WTO Doc. IP/C/W/175, above, n. 30, and GRAIN, "Plant variety protection to feed Africa?", 16/4 *Seedling* 2 (1999).

⁴³ See *Plant Variety Protection to Feed Africa? Rhetoric versus Reality* (Barcelona: GRAIN, 1999).

⁴⁴ *Id.*

⁴⁵ See, e.g., R. Sharma and T.T. Poleman, *The New Economics of India's Green Revolution—Income and Employment Diffusion in Uttar Pradesh* (Delhi, 1994).

⁴⁶ See, e.g., V. Shiva, *The Violence of Green Revolution* (London, 1991).

⁴⁷ See, e.g., L. Bavadam, "Retrograde Development", 17/11 *Frontline* 73 (2000).

pollution with pesticides.⁴⁸ The green revolution has also been associated with the spread of monocultures which lead to a homogenization of species, greater vulnerability to insect pests and diseases, and to a loss of agro-biodiversity.⁴⁹ Second, the sustainability of the yield increases has been questioned in view of evidence of diminishing returns on intensive production with new varieties.⁵⁰ Third, the application of the new technique necessitates important investments in seeds, fertilizers, pesticides and irrigation, which are beyond the resources of all but the biggest farmers.⁵¹ Indeed, new varieties perform well only when all the necessary inputs are available in sufficient quantities.⁵² Thus, irrigation is often necessary given that crops may fail if water is not provided in sufficient quantity at the opportune time. Uniformly produced seeds may also not be as well adapted to local conditions as farm-produced seeds. Further, new seeds tend to be much more expensive than farm-saved seeds.⁵³ More generally, there is increasing apprehension that the focus on quantitative increases may be inappropriate to solve hunger. In this regard, the performance of India is noteworthy. While the country is now more than self-sufficient in the aggregate, hundreds of millions of people still go hungry every day. It thus seems that quantitative increases in yield only constitute one of the factors to alleviate hunger. It is now acknowledged that a more effective response to malnutrition lies in land redistribution.⁵⁴

It is significant that the introduction of the green revolution was premised on principles which differ completely from the rationale for the introduction of patents on plant varieties.⁵⁵ Indeed, green revolution varieties were the outcome of public research efforts based on the principle of free exchange of germplasm with a view to fostering food security across the world. The promoters of the green revolution did not specifically promote commercial exploitation for profit. In the case of the introduction of patented varieties, the private sector is not directly concerned with food security but mainly with profits, one of the major incentives for its participation being the availability of patents or plant breeders' rights. Despite the different premises, a number of lessons can be learnt from the experience accumulated over the past three decades. This is due to the fact that in practice, while the motives may be different, the effects are broadly similar.⁵⁶ The green revolution package, like the introduction of patented varieties, focuses on monocultures and on yield enhancement. Further, they both lead to the diminution of the farmer's ability to save seeds. In the case of green revolution

⁴⁸ See, e.g., B. Agarwal, *Gender, Environment and Poverty Interlinks in Rural India 7* (Geneva: UNRISD, 1995) and G.S. Dhaliwal and V.K. Dilawari, "Impact of green revolution on environment", in B.S. Hansra and A.N. Shukla (eds.), *Social, Economic and Political Implications of Green Revolution in India* (New Delhi, 1991).

⁴⁹ See, e.g., L.A. Thrupp, "Linking agricultural biodiversity and food security: The valuable role of agrobiodiversity for sustainable agriculture", 76 *Int'l Aff.* 265 (2000).

⁵⁰ See, e.g., G.R. Conway and E.B. Barbier, *After the Green Revolution—Sustainable Agriculture for Development* (London, 1990).

⁵¹ See, e.g., B.H. Joshi, *An Analytical Approach to Problems of Indian Agriculture: A Theoretical and System Approach* (New Delhi: 1992).

⁵² See, e.g., Conway and Barbier, above, n. 50.

⁵³ See, e.g., C.G. Kahama, *Tanzania into the 21st Century* (Dar es Salaam, 1995).

⁵⁴ See, e.g., P. Rosset *et al.*, "Lessons from the green revolution—do we need new technology to end hunger?", 15 *Tikkun* 52 (2000).

⁵⁵ See, e.g., R. Paarlberg, *Agrobiotechnology Choices in Developing Countries* (Science, Technology and Innovation Discussion Paper No. 1, Harvard: Center for International Development, 1999).

⁵⁶ Cf. L.L. Jackson, "Agricultural industrialization and the loss of biodiversity", in L.D. Guruswamy and J.A. McNeely (eds.), *Protection of Global Diversity: Converging Strategies* 66 (Durham, NC, 1998).

seeds, farmers are not technically bound to purchase new seeds each year, but the yield of saved seeds is clearly much lower even in later years. This constitutes a very strong incentive for yearly purchases. In the case of patented varieties, farmers are not supposed to replant saved seeds. In practice most small farmers in African countries will be able to carry on the practice of saving seeds because litigation with millions of small farmers by seed companies is simply not feasible unless the companies produce seeds for staple foods with the so-called terminator technology.⁵⁷ Generally, the main lesson of the green revolution for the development of plant variety protection in developing countries is that a focus on yields alone may not be appropriate for environmental and socio-economic reasons. If the availability of food in more than sufficient quantities in India has not led to the disappearance of malnutrition, there is a need to look beyond to the structural problems that impede a better distribution of existing food supplies. The allocation of property rights seems to provide one of the major elements in this equation. In this context, while the question of land rights and distribution remains absolutely fundamental, the allocation of property rights over knowledge is not of any lesser importance.

Shortcomings of monopoly rights in agriculture

While the previous section has highlighted some of the practical problems linked to the introduction of monopoly rights in agriculture, a number of conceptual issues must also be analysed. As noted, agriculture was traditionally kept outside the purview of the patent system. This exclusion was premised on elements of public morality, the need to foster innovations at all levels from the smallest farmer to multinational companies, and the need to keep sectors dealing with the most basic needs of humankind such as food and health outside the purview of the patents system so as to avoid the over-commercialization of these sectors. In principle, monopoly rights on plant varieties do not differ from other monopoly rights. However, the agricultural sector holds a special place in the economy because it provides for most of the food needs of all human beings. Further, in most sub-Saharan countries, subsistence agriculture remains dominant. In this situation, it is impossible to assume that farmers innovate only to make a monetary profit. Indeed, even when local knowledge is protected, for instance, by being restricted or secret, it is usually not the case that this is done exclusively for commercial reasons.⁵⁸

Generally, monopoly rights are likely to have a number of impacts on farmers' agricultural practices and farmers' lives in sub-Saharan countries. First, they have the potential to conflict with established agricultural management practices of small farmers. This is due to the fact that the two systems rely on and promote different knowledge systems, identify innovations differently and reward inventors in different ways. In fact, while the reward system established by monopoly rights is mainly financial, local management practices do not concentrate exclusively on financial incentives for innovation. The conflict between the different systems is, for instance, apparent in the definition of plant breeders' rights. A variety tended by farmers stands virtually no chance of meeting the conditions laid down by

⁵⁷ See, e.g., US Patent 5,723,765, *Control of Plant Gene Expression*, issued 3 March, 1998.

⁵⁸ See, e.g., N. Roht-Arriaza, "Of seeds and shamans: the appropriation of the scientific and technological knowledge of indigenous and local communities", 17 *Michigan J. Int'l L.* 919 (1996).

the UPOV Convention to define novelty and farmers can therefore not be recognized as breeders.⁵⁹ This explains why the UPOV system is criticized for only rewarding breeders who make it a business to develop seeds, while the majority of farmers' innovations are excluded from legal protection.

More generally, the problem is that monopoly rights do not recognize the scientific or technical knowledge of farmers and other local actors as scientific knowledge worthy of protection.⁶⁰ Consequently, it is assumed that knowledge which is not protected by monopoly rights is in the public domain and thus freely available. This is very unfortunate because it gives the impression that the work of the managers of biodiversity is deprived of value but the work carried out in laboratories is the only work that adds value to the final product. Within the patent system, farmers and other local actors contribute to the research effort of others without being attributed any right to their work.⁶¹

Second, farmers' knowledge is often less individualistic than scientific knowledge produced in laboratories. Even if it is usually possible to identify one specific individual as having made a specific contribution to a given technical or scientific development, it is in most cases unlikely that s/he will be the exclusive innovator. This is one reason why monopoly rights which channel all the benefits to a single inventor are inadequate, since they marginalize or even negate the contribution of the different actors present, and will inevitably limit or stop free access to the invention by other users. In the agricultural sector, problems arise from allocating all the benefits of a given invention to a single actor. At the local level, similar or close varieties may have been developed in different areas or countries by different communities, and the patent system is by definition incapable of assigning rights to a diverse range of actors. Further, the fact that the first claimant receives all the benefits implies a race to the finish between different innovators. Forcing all actors to compete for the same unique prize implies that farmers and multinational companies have the same capacity to benefit from the system. In practice, farmers cannot derive any benefits from such a system.

Third, monopoly rights in agriculture generally foster the commercialization of a number of major agricultural inputs. One the most direct impacts of patents is to raise the price of patented seeds compared to other seeds. Further, while patents on seeds only give patentees rights on seeds, impacts are in practice far more wide-ranging. Farmers become not only dependent on private firms for their seeds but also for such other inputs as pesticides and fertilizers.⁶² This is exemplified by recent developments in genetic engineering where some firms have developed seeds which are predisposed to react favourably to the application of their own herbicide.⁶³ As shown by the example of some countries, patenting

⁵⁹ Cf. M.V. Rao, "Viewpoint of public sector plant breeding institutions", in M.S. Swaminathan (ed.), *Agrobiodiversity and Farmers' Rights* 136 (New Delhi, 1996).

⁶⁰ Cf. N.S. Gopalakrishnan, "Impact of patent system on traditional knowledge", XXII *Cochin U.L. Rev.* 219 (1998).

⁶¹ Cf. D. Wood, "Comment", in M.S. Swaminathan (ed.), *Agrobiodiversity and Farmers' Rights* 128 (New Delhi, 1996).

⁶² See, e.g., V. Shiva, *Future of Our Seeds, Future of Our Farmer—Agricultural Biodiversity, Intellectual Property Rights and Farmers' Rights* (New Delhi: Research Foundation for Science, Technology and Natural Resource Policy, 1996).

⁶³ See, e.g., J. Mendelson, "Roundup: The world's biggest-selling herbicide", 28/5 *Ecologist* 270 (1998).

in agriculture may eventually lead to the integration of a majority of steps in the food production system.⁶⁴

Fourth, monopoly rights have generally not been known to foster conservation of biological diversity or to promote its sustainable use.⁶⁵ In general, patented varieties have the tendency to displace local varieties and to foster monocultures.⁶⁶ This leads in turn to a loss of agro-biodiversity in cases where farmers cease maintaining existing local varieties.

Finally, it is striking that it is not only subsistence farmers who are at risk. Indeed, as noted by IPGRI in countries with scanty internal breeding capacity, the entry of multinational companies active in this field is unlikely to foster directly the development of domestic industrial capacity.⁶⁷ It is thus unlikely that domestic breeding industries would substantially benefit from the introduction of monopoly rights. The fact that an overwhelming majority of applications for plant breeders' rights in both South Africa and Kenya comes from foreign institutions is a case in point.

LESSONS FROM INDIA CONCERNING THE DEVELOPMENT OF PLANT VARIETY PROTECTION

While a number of sub-Saharan African countries have taken steps towards complying with their TRIPS obligations in the field of plant variety protection, there has been relatively little debate in these countries concerning the appropriateness of introducing monopoly rights, such as plant breeders' rights. In contrast, the controversy over the introduction of intellectual property rights in agriculture and other fields such as pharmaceuticals has been significant in India. India's importance in this debate is linked to a number of elements. It has been one of a few developing countries where significant debate has taken place over a long period of time concerning the introduction of monopoly intellectual property rights brought about by the TRIPS Agreement. Further, the Patents Act of 1970 endeavoured to balance the commercial incentives given to the private sector with the public interest, in particular where the fulfilment of basic needs was concerned. The patentability of any method of agriculture or horticulture was, for instance, prohibited.⁶⁸ This implies that the patents regime must now be significantly modified to be in compliance with TRIPS. Generally, developments towards compliance with TRIPS in India have been carefully monitored by WTO member states because of the significant resistance to changes within the country and because of its importance among developing

⁶⁴ Concerning the USA, see, e.g., N.D. Hamilton, "Why own the farm if you can own the farmer (and the crop)?—Contract production and intellectual property protection of grain crops", 73 *Nebraska L. Rev.* 48 (1994).

⁶⁵ See, e.g., D. Leskien and M. Flitner, *Intellectual Property Rights and Plant Genetic Resources: Options for a Sui Generis System* (Rome: International Plant Genetic Resources Institute, 1997).

⁶⁶ See, e.g., Suman Sahai, "What is bt and what is terminator?", XXXIV/3-4 *Econ. & Pol. Wkly* 84 (1999).

⁶⁷ See International Plant Genetic Resources Institute, *Key Questions for Decision-Makers—Protection of Plant Varieties under the WTO Agreement on Trade-Related Aspects of Intellectual Property Rights* (Rome: IPGRI, 1999).

⁶⁸ India, s. 3 of the Patents Act, 1970 (before changes necessary for TRIPS compliance).

countries.⁶⁹ In the field of plant variety protection, the necessity to develop a response to article 27.3(b) TRIPS has led to a number of proposals by governmental and non-governmental institutions, and experience gained in India is of significant relevance to African countries. While India is much larger than any African country, there are significant points of comparison. This includes, in particular, the importance of agriculture as a direct source of food needs for a majority of the population and the importance of the primary sector in terms of employment.

National legislative proposals

The Indian government has introduced three bills that relate directly or indirectly to plant variety protection. The first is an amendment to the Patents Act, 1970, which seeks to broadly put India in conformity with its TRIPS obligations. When adopted, this amendment will fundamentally alter the character of the patent legislation, which was based on the need to balance the granting of monopoly rights with provisions to ensure that these rights were not used in a way detrimental to the public at large, and with specific exclusions in some fields related to the fulfilment of basic needs such as health and food. In other words, while the 1970 Act accepted some aspects of the monopoly inherent in the patent system, it sought to contain and discipline them.⁷⁰ The amendment to the Patents Act does not deal directly with plant varieties but it will have significant impacts in this field through the expansion of the scope of patentability brought about by the TRIPS Agreement.

The second bill is the Plant Variety Protection Bill.⁷¹ It mainly purports to introduce plant breeders' rights providing protection to varieties developed by commercial breeders. The Bill does not attempt to provide an indigenous definition of these rights but derives its provisions nearly word for word from the UPOV Convention. The title of the Bill implies that it provides in equal measure for farmers' and plant breeders' rights. In reality, it devotes a single short provision to the definition of farmers' rights. The Bill only protects the rights of farmers to save, use, exchange, share or sell their farm produce of a protected variety. In other words, the Bill only grants farmers rights over the crops they grow. By contrast, the draft revised International Undertaking recognizes that farmers' rights include the protection of traditional knowledge, the right to participate in sharing the benefits arising from the use of plant varieties and the right to participate in decision-making concerning their management. It also recognizes that, at a minimum, no limits should be put on the rights that farmers have to save, use, exchange and sell farm-saved seed/propagating material.

⁶⁹ India has, for instance, already been taken twice to the WTO dispute settlement mechanisms for failing to implement one specific provision of TRIPS concerning product patents on pharmaceutical and agricultural chemical products. See India—Patent Protection for Pharmaceutical and Agricultural Chemical Products (US complaint), Report of the Panel, 5 September, 1997, WTO Doc. WT/DS50/R; India—Patent Protection for Pharmaceutical and Agricultural Chemical Products (US complaint), Report of the Appellate Body, 19 December, 1997, WTO Doc. WT/DS50/AB/R and India—Patent Protection for Pharmaceutical and Agricultural Chemical Products (EC complaint), Report of the Panel, 24 August, 1998, WTO Doc. WT/DS79/R.

⁷⁰ See, e.g., R. Dhavan and M. Prabhu, "Patent monopolies and free trade: Basic contradiction in Dunkel draft", 37 *J. Indian L. Institute* 194 (1995).

⁷¹ Protection of Plant Varieties and Farmers' Rights Bill, 1999, Bill No. 123 of 1999.

The third bill of relevance to plant variety protection is the Biological Diversity Bill.⁷² This Bill is not a direct response to the TRIPS Agreement but rather to the CBD. Its main intent is to regulate access to biological resources. Even though it stops short of clearly defining property rights over these resources, a number of provisions are of direct relevance to plant variety protection. The Bill generally takes the position that monopoly rights, in particular patents, have been recognized at the international level, and that the most a country like India can do is to try to regulate access by foreigners to its resources and knowledge. In this context, the Bill seeks to discipline the intellectual property rights regime by stating that anyone wishing to apply for a monopoly right in India should first obtain permission from the National Biodiversity Authority.⁷³ The Bill's most innovative provision with regard to intellectual property is section 21, which authorizes the Authority to grant joint ownership of intellectual property rights either to itself or to an actor having contributed to the invention where s/he can be identified. It is noteworthy that this is part of the measures the Authority takes to put in practice benefit sharing. The Bill includes other provisions which are problematic with regard to the allocation of property rights over biological resources. Thus, even though benefit sharing includes the sharing of the property rights at stake, it is significant that local innovators do not have a right to this allocation and that the Authority remains the final arbiter over the allocation of property rights.

Other proposals and activities

Non-governmental actors, both activists and researchers, have made a number of proposals to react and adapt to the WTO regime. Generally, these proposals focus on the introduction of monopoly rights mandated by the TRIPS Agreement and propose ways to fight or adapt to it. The extension of the patents regime to India is thus often taken as a given,⁷⁴ and relatively little effort has gone into devising alternatives to monopoly rights. Existing proposals range from trying to extend the benefits of the patents system to new actors to lessening the consequences of introducing patents on biological resources.

Proposals have been made to alter the patent system so that it recognizes the informal and communal system of innovation which characterizes the ways through which farmers and indigenous communities produce, select and breed diverse crops and livestock varieties.⁷⁵ In practice, this implies the recognition of collective intellectual property rights. Generally, these proposals do not question the patents system itself but seek to broaden its purview to new actors. The rationale for doing so is to stop "normal" patentees such as multinational companies from acquiring monopoly rights on inventions realized partly by others. One such proposal is the privately proposed Biodiversity (Rights and Protection) Bill, 1998, which proposes the establishment of biodiversity-related community intellectual rights.⁷⁶ It proposes the development of the same

⁷² Biological Diversity Bill, 2000, Bill No. 93 of 2000.

⁷³ S. 6 of the Biological Diversity Bill, above, n. 72. Note, however, that this provision does not apply in the case of patents.

⁷⁴ Cf. M. Gadgil, "A framework for managing India's biodiversity resources in the context of CBD and GATT", 1/1 *R/S Biotechnology & Dev. Rev.* 1 (1997).

⁷⁵ See, e.g., Shiva, above, n. 62.

⁷⁶ See Biodiversity (Rights and Protection) Bill, 1998 (New Delhi: Research Foundation for Science, Technology and Ecology & Lawyers Collective, 1998).

monopoly rights previously used to foster the development of a seed industry to exclude current holders of monopoly rights and the allocation of similar monopoly rights to local communities.

Another set of proposals focuses on practical activities such as the creation of biodiversity registers. Some of the rationales for these registers are to document existing knowledge to stop patent claims from being accepted in other jurisdictions because of a lack of written description and to levy charges on bioprospecting or royalties on the commercial use of the materials or knowledge. These registers have gained in prominence in recent years because of patent applications filed abroad concerning biodiversity-related knowledge coming specifically from India.⁷⁷ A number of schemes have been proposed in the last few years. One noteworthy example is the case of the village of Pattuvam in Kerala, which undertook to register natural resources and knowledge pertaining to these resources found within the village. One of the distinguishing features of this register is that it is accompanied by a People's Biodiversity Declaration which outlines the aims for the existence of a register in very clear terms.⁷⁸ The Declaration first asserts that no monopoly claims on life forms will be accepted by people living in this area. It further adds that life forms, seeds, cells, genes or properties of life forms, regardless of whether these life forms are known to local inhabitants or not, or whether they are being used through direct knowledge or not, shall under no circumstances be subjected to patents or other monopoly rights. Other provisions detail, for example, the conditions under which experiments on life forms collected in the territory of Pattuvam can be undertaken. The register and its accompanying declaration are thus used to assert local people's rights over resources found in their territory and the knowledge concerning the management of these resources. Further, the villagers have decided to keep the register secret and to allow information sharing only in exceptional cases. The register is thus not drawn up to foster the commercial exploitation of local resources by others but mainly to stop others from asserting rights over prior local knowledge.

As a corollary to the setting up of biodiversity registers, the development of benefit-sharing schemes has been proposed. Benefit sharing is generally linked to the idea that the knowledge of farmers and local communities is not susceptible to fulfilling patenting criteria or even that it should not be included in the patent system. A form of compensation, often in monetary form, has been proposed instead of property rights. Benefit sharing is proposed as an instrument to ward off biopiracy, which provides no compensation or recognition of local people's knowledge whatsoever. Benefit sharing has often been linked to the compilation of biodiversity registers. In practice it has, for instance, been suggested that the use of all public domain information derived from biodiversity registers should

⁷⁷ One of the most controversial has been a patent on turmeric. In this case, two US-based researchers applied for a patent on the use of turmeric in wound healing in the US. The alleged invention related to the use of turmeric to augment the healing process of chronic and acute wounds. This patent was challenged by the Council of Scientific and Industrial Research on the ground that the alleged invention was actually part of public domain knowledge in India. The patent was re-examined and all the claims cancelled. See US Patent No. 5,401,504, *Use of Turmeric in Wound Healing*, issued 28 March, 1995.

⁷⁸ The following description of the Declaration is based on an English translation by M. Kumar of the original Malayalam text.

be acknowledged in a patent application.⁷⁹ This acknowledgement constitutes the basis for the establishment of a fund that can be constituted partly of the royalties received by a given company having drawn on information contained in a register. In cases where a single person or community is the holder of the knowledge at stake, the fund can directly reward them. In other cases where the source of the knowledge is not certain enough or too widespread, the fund would be used for the general interest.

Apart from policy proposals, it is significant that farmers have also evolved strategies to cope with what is locally perceived as the negative side effects of the green revolution, such as loss of diversity. Seed saving and seed exchanges have been a common practice for many years. One noteworthy example is that of the Save the Seeds Movement.⁸⁰ This organization is made up of a group of farmers of the Garhwal region of northwest Uttar Pradesh who took up the challenge of saving and promoting local varieties. The immediate trigger for setting up the group was a major drought in 1986–88, coupled with pest epidemics, which highlighted some of the major weaknesses of the modern varieties that had been spreading fast in the valleys of the region.⁸¹ The premise for the work of these farmers is to freely exchange the seeds they collect with other farmers, both within the district and with other farmers throughout the country. They do not sell their seeds, though they may market the products of the crop obtained with these seeds.

Lessons learnt

The Indian experience is rich in lessons for the development of property rights regimes in African countries. First, it is apparent that none of the proposals reviewed constitutes a real alternative to patents, which could be used as the basis for the development of a *sui generis* regime. While the proposed plant variety legislation fundamentally introduces monopoly rights for formal plant breeders, other proposals have mostly evolved within the paradigm offered by the patents system. The proposal to introduce patents for local communities constitutes a significant conceptual endeavour, since it seeks to extend the benefits of the patent system to actors who have not usually been able to benefit from it. In theory, it would allow all relevant actors to benefit from the same property rights. However, it is highly unrealistic to expect that the patent system can deliver such benefits. Indeed, as long as one operates within a monopoly rights system that only rewards state-of-the-art knowledge, it is unlikely that local communities will substantially benefit from this new opportunity. This is due to the fact that formal breeders will always have the capacity to innovate faster than local farmers and will thus easily be able to appropriate claims of novelty.

⁷⁹ See, e.g., G. Utkarsh *et al.*, "Intellectual property rights on biological resources: Benefiting from biodiversity and people's knowledge", 77 *Current Science* 1418 (1999) and Gadgil, above, n. 74.

⁸⁰ See, e.g., V. Jhardari, "Involving farmers in the on farm conservation of crop genetic resources: A history of save the seeds' movement in Garhwal, Indian Himalayas", in T. Partap and B. Sthapit (eds.), *Managing Agrobiodiversity: Farmers' Changing Perspectives and Institutional Responses in the Hindu Kush-Himalayan Region* 351 (Kathmandu: International Centre for Integrated Mountain Development, 1998). See also, I. Khurana, "The seed supremo", 7/15 *Down to Earth* (31 Dec., 1998).

⁸¹ See, e.g., V. Singh, "Organizing mountain farmers to carry out *in situ* conservation of their agricultural resources' diversity", in T. Partap and B. Sthapit (eds.), *Managing Agrobiodiversity: Farmers' Changing Perspectives and Institutional Responses in the Hindu Kush-Himalayan Region* 341 (Kathmandu: International Centre for Integrated Mountain Development, 1998).

Biodiversity registers constitute an excellent tool to counter unwarranted patent applications. They provide written support to claims that knowledge already exists and can therefore not be patented as being “state-of-the-art”.⁸² Further, they can serve as an extremely useful source of knowledge for all farmers in case access is offered to other farming communities, and they may contribute to revitalizing the farmer’s role as a breeder. However, in the context of the development of a *sui generis* system, registers are not appropriate models because they are specifically promoted to counter the threat of patents. In other words, they constitute a defensive strategy which helps to mitigate the impacts of the international patents system on local farmers and communities, but do not constitute an alternative to patents. While registers can be very effective to counter patent claims by others on knowledge held locally, they cannot stop the utilization of genes from plants produced in a given village by outsiders who will then be able to patent novel products and processes. Further, registers are not associated with any rights on the knowledge recorded. Rather, the registers are meant to show that what is recorded is public knowledge and therefore not patentable. Farmers and local communities are thereby denied any rights to their knowledge.

The benefit-sharing strategy has also been proposed to reduce the impact of patents on farmers and local communities. Indeed, it constitutes a useful strategy to eliminate biopiracy which is marked by the absence of any acknowledgement, compensation or benefit sharing. However, even though the definition of benefit sharing is often very broad, it is in practice often limited to monetary compensation. In effect, this kind of benefit sharing legalizes and legitimizes the dispossession of local people’s rights over their resources and their knowledge. To avoid biopiracy, it sacrifices farmers and local communities’ rights.

The fact that all the policy proposals focus either on the introduction of monopoly rights or on ways to fight some of the undesirable impacts of the patents system illustrates some of the difficulties that the development of an alternative *sui generis* system implies. It is significant that despite the significant debates that have taken place concerning the strengthening of intellectual property rights that are being imposed on India by TRIPS, the main focus of interest has remained on patents. This can be explained in part by the fact that patents are the benchmark against which other systems are compared in TRIPS, but also by the fact that the most innovative actors in this field were opposed to the TRIPS Agreement and thus focused for several years on ways to avoid it altogether. It is likely that article 27.3(b) did not appear to be of any special interest after the signature of TRIPS, which was a major defeat for developing countries, in particular for countries like India where the Patents Act was extremely restrictive. This should not stop African countries from using the possibilities offered concerning plant variety protection to their full extent.

Another lesson which can be learnt from the Indian experience concerns the response that countries must give to their various international commitments. India, like most WTO member states, is also a party to the CBD. While the development of two different acts concerning plant varieties and biodiversity reflects the division apparent at the international level between TRIPS and the

⁸² They may be especially useful if the case of patent applications in the US where novelty is judged only against published materials, where the application relates to foreign knowledge. See United States Code, Title 35—Patents, 35 USC 102.

Convention, there is no substantive reason to justify this choice. Indeed, the Convention provides a broad framework for the management of biological resources and for the allocation of property rights to these resources and related knowledge. Plant varieties only constitute one specific subset of biological resources which could be the object of a separate section in a broad biodiversity management law. The need for more integrated legislative developments is, for instance, apparent in the fact that the two Acts each set up a separate national authority to oversee the implementation of each act. Countries which are still in the process of developing responses to both agreements should endeavour to adopt one encompassing piece of legislation.

The Indian experience also indicates that developments at the local level should be considered more carefully by policy makers. The two cases, briefly reviewed above, of activities initiated at the local level show that farmers and village communities do have answers to the problems posed by the introduction of monopoly intellectual rights or by the introduction of new varieties of crops. Their responses indicate clearly that monopolies are not the answer to the type of problems they face. While local communities and farmers may be tempted to restrict access to their knowledge if they feel threatened by the imposition of an alien property rights system, the case of the Save the Seeds Movement clearly illustrates the importance of sharing knowledge and resources in agricultural management. These initiatives, or similar endeavours in African countries, which may or may not be direct responses to international treaties, should be carefully integrated in the legislative framework to be designed.

Overall, the Indian example indicates that even in a country where significant attention has been given to issues surrounding the introduction of intellectual property rights in agriculture, local responses have not fully evolved. Further research on these issues is called for to allow African countries to develop property rights regimes over plant varieties that are fully adapted to their needs and conditions.

DEVELOPING *SUI GENERIS* PLANT VARIETY PROTECTION IN AFRICA

TRIPS provides that member states can protect plant varieties either through patents or an alternative system (*sui generis* system). A number of reasons militate in favour of taking advantage of this exception. First, in most sub-Saharan countries, agriculture is a sector of primary importance. Further, a large part of agricultural activities is subsistence agriculture. This implies that agricultural management is carried out by a variety of actors who include a large number of subsistence farmers. More generally, there is a close link between agriculture and the fulfilment of the food needs of all individuals. Acts adopted to implement TRIPS obligations should thus be drafted to reflect African countries' specific socio-economic conditions. In the current framework where commercial agriculture only provides a relatively small part of overall agricultural production, it is highly unlikely that a property rights model developed for countries with highly commercialized and comparatively small agricultural sectors would constitute an appropriate response.⁸³

⁸³ Cf. International Plant Genetic Resources Institute, above, n. 68, acknowledging that "an IPR suitable for an industrialized system of agricultural production, geared towards export, is unlikely to be appropriate for an agricultural sector characterized primarily by subsistence farming".

The introduction of a *sui generis* system undoubtedly constitutes a challenge for all African countries that are members of the WTO. While there seems to be widespread agreement in developing countries that patents are not appropriate in agriculture, a number of countries have been led to think that the model provided by UPOV is substantially different from patents. Relatively little conceptual work has gone into defining an alternative to monopoly rights. This is due to two main factors. First, while most countries operated on the basis of the free sharing of knowledge in the pre-TRIPS era, developing countries have not had much time to devise entirely new systems that had not been experimented with elsewhere.⁸⁴ Second, there has been significant pressure on developing countries to join UPOV to fulfil their obligations under article 27.3(b) TRIPS. Even though the deadline for implementing the agreement is now passed for African countries classified as developing countries, a number of them are yet to adopt plant variety protection regimes. Countries should use this opportunity to rethink their needs with regard to plant variety protection and adopt regimes which will benefit the majority of their population in the long term.

A *sui generis* plant variety property rights system should aim at fulfilling a number of goals. First, it should seek to foster food security for all individuals. As noted, aggregate increases in food production brought about by the green revolution have helped countries such as India to become self-sufficient. However, this quantitative increase has not been associated with similar improvements in the distribution of existing food supplies. It is thus imperative that the introduction of plant variety protection should not contribute to the same lopsided results but rather promote the fulfilment of basic needs for all. Secondly, a *sui generis* system should also contribute to sustainable agricultural management.⁸⁵ This implies that it should promote types of agricultural management which can be sustained in the long term, which do not lead to the erosion of the genetic base and which are adapted to local climatic conditions. Third, it should more generally contribute to the development of crops which do not harm the environment. It is therefore important that states include biosafety provisions as part of their legislations. The Indian plant variety bill is noteworthy in this regard since it includes a provision banning the registration of varieties containing genes or gene sequences involving technologies that are injurious to the life or health of human beings, plants or animals.⁸⁶ Fourth, a *sui generis* plant variety protection system should not be developed in isolation. Plant varieties are only a subset of biological resources and all countries that are members of the WTO and the CBD should aim at drafting a single all-encompassing law which takes into account CBD and TRIPS requirements.

The previous sections have shown that monopoly rights such as patents and plant breeders' rights do not seem to provide frameworks which can foster the goals just outlined. A *sui generis* system aiming at providing food security at the individual level and broadly fostering sustainable environmental management

⁸⁴ Indeed, the African group argued in 1999 that developing countries should be given another five years to implement art. 27.3(b). See World Trade Organization, The TRIPS Agreement: Communication from Kenya on Behalf of the African Group, WTO Doc. WT/GC/W/302, 6 August, 1999.

⁸⁵ Cf. art. 1 of the CBD, above, n. 12. See also, WTO Doc. WT/GC/W/302, above, n. 84, in which the African Group calls for the harmonization of art. 27.3(b) TRIPS with the provisions of the CBD and the International Undertaking.

⁸⁶ S. 14.2 of the Protection of Plant Varieties and Farmers' Rights Bill, 1999, Bill No. 123 of 1999.

should therefore establish property rights whose holders are not limited to one specific category of actor involved in agricultural management. Agricultural management is carried out by a multitude of stakeholders, and a system providing entitlements to all relevant actors should therefore be proposed. Further, an alternative system should recognize that the different actors do not all have the same motivation for innovating. While commercial incentives may be overwhelming for some categories of agricultural managers, this is not the case of all. Overall, a *sui generis* system is not one that excludes any category of actors from its purview, but rather it is a system which focuses on broadening the range of rights holders.

The *sui generis* systems envisaged under article 27.3(b) were not defined during the negotiations. Some elements can nevertheless be derived from the text. First, it implies the allocation of property rights. Forms of financial compensation which are being proposed under the guise of benefit sharing instead of property rights thus cannot constitute the core of a *sui generis* system.⁸⁷ Second, it is clear from the text that the drafters meant the *sui generis* system to be an alternative to patents. This alternative is by definition an intellectual property rights system because it is knowledge which is protected but it is an alternative to monopoly rights. A number of developing states have already taken advantage of the proposition that the patentability of plant varieties can be excluded, but they have been less successful in devising alternatives. Indeed, if the possibility to reject patentability is a significant step in the right direction, it is insufficient. A more substantive step is to use the *sui generis* option to reject all monopoly rights, whether patents proposed by TRIPS or plant breeders' rights proposed by UPOV.⁸⁸

The rejection of monopoly rights does not imply the rejection or promotion of any model of agricultural development. Indeed, the issue is not whether citizens of developing countries are for or against genetically engineered seeds and whether farmers will benefit or not from these varieties. What is fundamentally at stake is the allocation of property rights. The allocation of intellectual property rights is as fundamental as the allocation of land rights. Indeed, it has been repeatedly pointed out that the question of hunger has primarily been a question of land (re)distribution. The introduction of intellectual property rights in the management of biodiversity will have exactly the same drawbacks if the allocation of property rights is not undertaken specifically with a view to fostering the realization of everyone's basic food needs.

In practice, a number of strategies can be used by African states to provide plant variety protection as required by TRIPS, but under conditions which do not threaten their interests and the interests of their population. First, they can replicate a solution proposed in the context of the interpretative resolutions to the International Undertaking, by recognizing concurrently and equally the rights of farmers and the rights of commercial breeders. The fundamental element is that the two sets of rights should both have the same importance. Legislation, such as the African model legislation, which puts on the same level

⁸⁷ Proposals aiming at "converting rights into financial rewards" do not qualify as *sui generis* systems. Cf. M. Geetha Rani, "Community gene banks sustain food security and farmers' rights", 41 *Biotechnology & Dev. Monitor* 19 (2000).

⁸⁸ Interestingly, even though the regime proposed does not fully match this provision, the African Model Legislation, above, n. 22, provides in its preamble that patenting or the exclusive appropriation of any life form violates the fundamental human right to life.

local communities, farmers and breeders, heads in the right direction. However, the rights provided to farmers and local communities must be as strict as the rights offered to breeders if these statements are to go beyond rhetoric. To take the example of the model law, the substance of the law does not match the principles enunciated at the outset. Local communities can, for instance, only prohibit access to their biological resources and related knowledge where this is detrimental to the integrity of their natural or cultural heritage.⁸⁹ The balance between the property rights of farmer breeders and commercial breeders is also not attained if the only right farmers have is to be able to charge a fee from commercial breeders when their varieties are used.⁹⁰

The concurrent recognition of the rights of various actors is not sufficient in itself. Indeed, in many cases, commercial breeders use material or knowledge developed by other actors. In terms of property rights, it may be necessary in these cases to allocate rights jointly. Where no specific inventor can be identified, a public authority at the national or international level may become the joint owner of the variety with a mandate to use the variety to further socio-economic goals.⁹¹ If the variety is of a staple food crop, this would allow its dissemination at the lowest possible cost to all farmers.

A more evolved property-rights system than a simple transposition of the principles of the International Undertaking would be to define the entitlements of all actors in plant breeding and agricultural management. This would include not only farmers and commercial breeders, but also local communities, indigenous peoples and national agricultural research institutes. Entitlements should be provided to each actor, and they should generally not be exclusionary since most of the knowledge and resources which are used are derived from some other source maintained by human beings. In this situation, none of the entitlements can prevent other actors from carrying on their activities.

Apart from the allocation of property rights to the various actors involved in plant variety management, states also have a number of tools at their disposal to influence the impacts of the property-rights regime set up. They can, for instance, limit the number of varieties that can be protected for commercial use. Thus, to foster the fulfilment of basic food needs, it would be possible to prohibit the registration by commercial breeders of any cultivated species used to meet those food needs.⁹² The response of the CGIAR Centres faced with similar issues is also relevant here. While their mission remains to foster the management of genetic resources in order to help eradicate poverty, increase food security and protect the environment, they must do so in a world where private monopoly rights are gaining an increasingly important position. Until recently, the International Plant Genetic Resources Institute (IPGRI) gave a very interesting answer to this problem by stating that it did not believe monopoly rights had necessarily to be used in a monopolistic way. Accordingly, intellectual property

⁸⁹ Art. 20 of the African Model Legislation, above, n. 22.

⁹⁰ See, e.g., Art. 5 of the proposed Convention of Farmers and Breeders (New Delhi: Gene Campaign, 1998).

⁹¹ Note that the Indian biodiversity bill proposes that the national biodiversity authority could grant joint ownership of a patent either to itself or to identified contributors to the development of a given invention. See Biological Diversity Bill, 2000, Bill No. 93 of 2000.

⁹² A similar proposal was made by the Law Commission of India. See 171st Report on Biodiversity Bill (New Delhi: Law Commission of India, 2000).

rights were to be used only when the material would be used for the benefit of the poor in developing countries.⁹³

Another strategy that can be used to influence the practical impacts of a given property rights regime is to allocate different durations to different rights. In a situation where plant breeders' rights and farmers' rights are recognized as equal rights, it is possible to foster broader development policy goals by reducing the duration of commercial breeders' rights as much as possible and extending farmers' rights as far as possible. The reduction of commercial breeders' rights is something that had been successfully implemented, for instance, in the Indian Patents Act of 1970, which provided that the duration of patents on processes of manufacture for substances intended for use as food would be half the normal term.⁹⁴

The allocation of rights may remain ineffective in practice if the rights holders are not aware of their rights and the duties of other rights holders. Thus, if a variety is used by a breeder to develop a variety with different traits in a laboratory for which a monopoly right is sought, the international intellectual property rights regime normally takes the view that the claim is to be upheld unless someone contests the claim. In the case of plant varieties and related knowledge, this proves to be extremely problematic both at the international and domestic levels. At the international level, several cases linked to knowledge and biological resources from India have highlighted the limitations of the current system, which puts the burden of proof entirely on the party contesting the claim. While a few patents have been successfully contested in Europe and the United States,⁹⁵ these constitute only a fraction of all the patents that are controversial.⁹⁶ At the domestic level, farmers or local communities may face similar problems if they want to contest the registration of a variety by a commercial breeder. The proposed Indian plant variety legislation intimates, for instance, that it is for the people who think a registered variety builds partly on their own resources or knowledge to file a claim.⁹⁷ To counter these problems, national legislation could, for instance, provide that the burden of proof should be on the defendant.

As noted, the development of plant variety protection to comply with TRIPS does not occur in a vacuum. Most countries have other international obligations in this field. The CBD is central in this regard since it constitutes the main instrument concerned with biological resources. Further, it acknowledges the potential impacts of intellectual property rights on biodiversity management and even gives specific guidance to member states by stating that they should ensure that such intellectual property rights are supportive of and do not run counter

⁹³ See IPGRI Policy on Intellectual Property, 11 March, 1999 (now superseded by a March 2000 policy).

⁹⁴ See s. 53 of the Patents Act, 1970 (before changes necessary for TRIPS compliance).

⁹⁵ See, e.g., US Patent No. 5,401,504, *Use of Turmeric in Wound Healing*, issued 28 March, 1995.

⁹⁶ The relatively low number of patents contested is explained in part by the cost involved in filing oppositions and the difficulties linked to the necessity to file where the patent was applied for. The case of US patent No. 5,663,484 concerning basmati rice illustrates this well. Before submitting its case in the US, the Indian government already assembled some 1,500 pages of material to be able to counter each of the claims made. See, e.g. R. Ramachandran, "Challenging the basmati patent", 17/10 *Frontline* 79 (2000). See also, WTO, Protection of Biodiversity and Traditional Knowledge—The Indian Experience, WTO Doc. WT/CTE/W/156—IP/C/W/198, 14 July, 2000.

⁹⁷ See art. 48 of the Protection of Plant Varieties and Farmers' Rights Bill, 1999, Bill No. 123 of 1999.

to the objectives of the Convention.⁹⁸ Since states have to comply with all their international obligations concurrently and most WTO member states are parties to the CBD, it is imperative that a plant variety protection regime should also comply with states' other environmental commitments. It is thus of the utmost importance that member states adopt legislation concerning the management of biological resources that covers all relevant aspects. This implies that a plant variety protection regime should not normally be a separate piece of legislation. Plant varieties are only a subset of all biological resources which should be covered under an act for the implementation of the CBD. Situations where different national authorities for plant variety protection and for biodiversity with varying and/or overlapping mandates are set up, as in the case of India, should be avoided. In principle, there should be a generic regime for the management of all biological resources, which may include a specific sub-section concerning plant varieties where required by the subject matter or by the TRIPS Agreement.

Article 27.3(b) TRIPS focuses on the specific issue of plant varieties. There are, however, a number of other areas, in particular health, where TRIPS does not allow the development of a *sui generis* system even though the need for an alternative to patents in most developing countries is glaring. The benefits that developing countries can derive from a *sui generis* system in agriculture should push them to demand the same in the field of health. Finally, even if TRIPS is not modified in the next few years to accommodate more exceptions to patentability, the relevance of *sui generis* protection will remain. Indeed, in the context of the CBD, all developing countries will have to consider ways to regulate the management of biological resources and associated knowledge within their countries. The calls for the establishment of *sui generis* systems to protect traditional knowledge constitute part of the challenges that developing countries will have to tackle.⁹⁹ The issues they will face in terms of property rights in the context of the CBD are substantively similar to the issues outlined in this article concerning plant variety protection under TRIPS. Even if some countries decide to evade the debate for now in the context of their TRIPS obligations, they will have to consider these issues in the near future in the broader context of the CBD.

⁹⁸ Art. 16.5 of the CBD, above, n. 12.

⁹⁹ See, e.g., art. 8(j) and Related Provisions, Dec. V/16, in Report of the Fifth Meeting of the Conference of the Parties to the Convention on Biological Diversity, Nairobi, 15–26 May, 2000, UN Doc. UNEP/CBD/COP/5/23.