



International Environmental
Law Research Centre

REVISION OF THE TRIPS AGREEMENT CONCERNING THE PROTECTION OF PLANT VARIETIES

LESSONS FROM INDIA CONCERNING THE DEVELOPMENT OF A SUI GENERIS SYSTEM

Philippe Cullet

Published in: 2 *Journal of World Intellectual Property* (1999), p. 617.

*This paper can be downloaded in PDF format from IELRC's website at
<http://www.ielrc.org/content/a9903.pdf>*

Revision of the TRIPS Agreement concerning the Protection of Plant Varieties

Lessons from India concerning the Development of a Sui Generis System

Philippe CULLET*

INTRODUCTION

The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement) is today at the centre of the international regime concerning the protection of intellectual property rights (IPRS). It is of great significance for most developing countries, since its ratification implies important changes in the IPR laws, which were relatively underdeveloped compared to developed countries, whose laws were already mostly in conformity with the TRIPS Agreement before 1995.¹ The upcoming entry into force of the TRIPS Agreement for developing countries makes the issue of compliance with the Agreement a subject of great relevance.

The TRIPS Agreement imposes, *inter alia*, the introduction of a form of legal protection on plant varieties. The impacts of this provision will be critical for millions of farmers in the South. Historically, plant varieties had been exempted from the international patent regime in deference to farmers' traditional practices of saving and exchanging seeds. Progressively, after the Second World War, a hybrid form of protection was developed in the context of the International Convention for the Protection of New Varieties of Plants (UPOV Convention), which included, until recently, mainly Organisation for Economic Co-operation and Development (OECD) countries. The TRIPS Agreement now extends the requirement to protect plant varieties to all World Trade Organization (WTO) Member States.

* International Environmental Law Research Centre (IELC), Geneva, Switzerland. E-mail: <<ielc@iname.com>>

The completion of this study would not have been possible without the generous support of the Swiss Development Agency which funded the field research component in India. This study has also benefited from the involvement of the Berne Declaration and the Swiss Coalition of Development Organizations.

Thanks to Anuj Bhuwania for his assistance in the research phase; Jharana Jhaveri, Shyam Bahadur Namra, Aman Namra, Pemmaraju Sreenivasa Rao, Anuradha Singh and Anurag Singh for their varied and unlimited support; Sarat Babu, Utkarsh Ghate, N.S. Gopalakrishnan, Afsar H. Jafri, Vijay Jardhari, Thomas Kocherry, Vinod Krishnan, A. Mohan Kumar, K. Abdul Latheef, Vanaja Ramprasad, Suman Sahai, K.V. Sivaprasad, Thakra Moni Thomas and Regi Thomas for contributing their time, sharing written and oral information and helping in various other ways; Patricia Kameri-Mbote, Nadine Keim and Thierry Pellet for their comments and insights on the draft text.

¹ See, e.g., Carlos M. Correa, *Patent Rights*, in Carlos M. Correa and Abdulqawi A. Yusuf, eds., *Intellectual Property and International Trade—The TRIPS Agreement*, Kluwer Law International, London, 1998.

This study focuses on plant variety protection in the context of the TRIPS Agreement and in particular examines whether the introduction of patents on plant varieties is likely to be beneficial for all actors involved in agriculture. It concentrates specifically on the possibility offered by Article 27.3.b of the TRIPS Agreement, which provides that Member States can choose to provide plant variety protection through a *sui generis* system. It further focuses on the specific case of India, which is of great importance in this context for various reasons. First, compliance with the TRIPS Agreement will imply wide-ranging legislative changes for India. This is due partly to the fact that the current patents regime was developed specifically for the Indian situation and includes a number of provisions which restrict the scope of patents with a view to balance the interests of the private sector with the need to foster the realisation of basic needs, for instance, with regard to food and medicines. Second, India's rural population still accounts for more than 70 percent of the total population, and there is still an extremely large farming community which often mainly depends on food grown locally. Third, the patenting in foreign countries of several well-known plants or their uses, such as patents on turmeric, neem or basmati, have been extremely controversial within the country and have been the object of significant public debate. Fourth, various actors have devoted significant attention to the protection of plant varieties in India.

This study makes the case for the maintenance of an exception to patentability for plant varieties. It examines what has been proposed both in the governmental and non-governmental sectors. Since none of these proposals constitutes an alternative to the patents system, it further seeks to outline a framework for the development of a *sui generis* regime. While focusing on the Indian situation, all the main findings of this study can be extended to a number of other developing countries which are in a broadly similar situation.

The text is divided into four main sections. The first section focuses on the patent regime in India, especially with regard to plant varieties. It further gives a broad description of the international legal regime governing the protection of plant varieties. The second section analyses the impact of patents on different relevant actors in India, with a particular focus on farmers. The next section highlights official responses and other proposals to modify existing acts and adopt new provisions in response to developments at the international level. The last section gives pointers regarding future action at the domestic and international levels concerning the legal protection of plant varieties.

I. THE LEGAL REGIME CONCERNING THE PROTECTION OF PLANT VARIETIES IN INDIA

The importance given to the protection and sustainable management of plant and animal varieties is linked to the fact that they constitute the basis for humankind's food

needs. The diversity of plant varieties is of fundamental importance since the loss of genetic diversity can have grave consequences, as illustrated, for instance, by the great Irish famine of the mid-19th century.

Plant varieties have traditionally been developed and nurtured by a variety of actors. Smallholder farmers, herders and artisanal fisherfolk have often played the most crucial role in conserving and enhancing agro-biodiversity. They have, for instance, developed crop varieties specifically suited to their diverse local environments.² In recent times, the development of new varieties has been undertaken on a larger scale and has become a major industrial activity.³ In all cases, plant varieties of interest in the context of agriculture have been tended by humans and do not correspond to varieties found in nature.

In practice, plant varieties are identified through their seeds, which constitute a main focus of interest for all actors involved in their management. While seeds have traditionally been freely exchanged among all types of breeders, there have been moves towards restricting the flows of knowledge. This has been accompanied by the development of forms of legal protection of this knowledge.

A. THE INDIAN PATENT REGIME

1. *Introductory Remarks on Patents*

Patents constitute one form of intellectual property rights. The rationale for their introduction is to balance the right of inventors to derive benefits from their inventions and the rights of the public to have access to novel ideas. The introduction of patents is specifically meant to encourage the development of new technologies and industries.⁴ The necessity to define a form of legal protection stems from the nature of intellectual property. Even though intellectual property does not diminish once knowledge is shared, the role of patents is to ensure that information providers do not lose rights to the information by disclosing it, since such information can be used by an infinite number of persons simultaneously.⁵ Patents are conceived as a form of temporary monopoly right. In practice, inventors must disclose the details of their invention and in return are allowed to stop others from exploiting the invention without an explicit licence.⁶ Traditionally, a distinction has been made between process and product patents. The former covers only the method or technology through which a product is manufactured while the latter encompasses the substance or product.

The criteria for the obtention of a patent are the object of a broad consensus. Most

² See, e.g., José Esquinas-Alcázar, *The Realisation of Farmer's Rights*, in M.S. Swaminathan, ed., *Agrobiodiversity and Farmers' Rights*, Konark Publishers, Delhi, 1996, p. 2.

³ See, e.g., Carlos M. Correa, *Access to Genetic Resources*, 20 W. Comp. 3, p. 57 (1997).

⁴ See, e.g., P. Narayanan, *Patent Law*, second edition, Eastern Law House, Calcutta, 1997.

⁵ See, e.g., Karen W. Baer, *A Theory of Intellectual Property and the Biodiversity Treaty*, 21 Syracuse J. Int'l L. & Com. 259 (1995).

⁶ See, e.g., Anthony D'Amato and Doris Estelle Long, eds., *International Intellectual Property Law*, Kluwer Law International, London, 1997.

patent laws and treaties accept that a patent can only be granted for an invention which is characterised by its novelty, its non-obviousness and its usefulness or industrial applicability. Thus, a patent is normally granted for an inventive advancement not obvious to someone skilled in the relevant art.⁷ Further, a patent can only be granted for an invention, and not for a discovery.

2. *Basic Characteristics of Indian Patent Law*

At independence, India inherited a legislative corpus closely related to the laws applicable in England, which included a 1911 Patents and Designs Act. It was widely felt that the law had to be overhauled, *inter alia* because up to 90 percent of Indian patents were held by foreigners, and about 90 percent were not used in India.⁸ The new government set up a committee to enquire into the usefulness of the 1911 Act for India. The interim report issued in 1949 by the Tek Chand Committee stated that the 1911 Patents Act had failed in its main purpose, which was to stimulate invention by Indians and to encourage the development and exploitation of new inventions for industrial purposes in the country so as to secure benefits to the largest section of the people.⁹ A further report by Justice Iyengar in 1957 recommended some stringent limitations on the scope of patentability and stated, for instance, that patentability should not be accepted where this would be detrimental to national health or well-being.

While the need to enact a new law was felt early on, it was only in 1970 that a new Patents Act was adopted. If India signalled through this decision that it could trust the concept of patents previously imposed by its former rulers and was even ready to enact an act broadly in line with the 1949 U.K. Patents Act, the 1970 Act is noteworthy for its attempts to mitigate some of the perceived negative impacts of patents. In other words, while it accepts some of the monopoly inherent in the patent system, it seeks to contain and discipline it.¹⁰

The scope of patentability constitutes a notable feature of the Act. The Act first excludes the patenting of life forms and specifically precludes the patentability of methods of agriculture or horticulture.¹¹ Further, while allowing for process patents on substances intended for use as food, medicine or drugs, the Act rejects the possibility to grant patents in respect of the substances themselves.¹² According to the definition given by the Act, drugs include insecticides, germicides, fungicides, weedicides and herbicides and all other substances intended to be used for the protection or preservation of

⁷ See, e.g., W.R. Cornish, *Intellectual Property: Patents, Copyright, Trade Marks and Allied Rights*, second edition, Sweet & Maxwell, London, 1989.

⁸ See, e.g., Martin J. Adelman and Sonia Baldia, *Prospects and Limits of the Patent Provision in the TRIPS Agreement: The Case of India*, 29 *Vanderbilt J. Trans'n L.* 507 (1996).

⁹ See, e.g., Rajeev Dhavan et al., *Power Without Responsibility on Aspects of the Indian Patents Legislation*, 33 *J. Indian L. Institute* 1 (1991).

¹⁰ See, e.g., Rajeev Dhavan and Maya Prabh, *Patent Monopolies and Free Trade: Basic Contradiction in Dunkel Draft*, 37 *J. Indian L. Institute* 194 (1995).

¹¹ See Section 3 of the Patents Act, 1970. See also C.S. Srinivasan, *Current Status of Plant Variety Protection in India*, in Swaminathan, *supra*, footnote 2.

¹² See Section 5 of the Patents Act, 1970.

plants.¹³ The Act not only restricts the scope of patentability with respect to food, medicine and drug but also reduces the duration of the term of process patents granted. While the general rule is that patents are granted for fourteen years, with respect to processes of manufacture for substances intended for use as food, medicine or drug, the term is of only seven years from the date of the patent.¹⁴ One of the rationales for the inclusion of such provisions was to keep the prices of essential items such as food and medicine down, in view of the difficulties of most people to have access to them.¹⁵

The Act also attempts to foster the protection of the public interest within the patents regime. Apart from restricting the scope of patentability, it provides, for instance, for restrictions of the rights of the patent holder. This constitutes a direct response to the fact that patents held by foreigners were often not used in India in colonial times. The Act thus states that the general principles governing the use of patents are:

- that patents are granted to encourage inventions and to secure that the inventions are worked in India on a commercial scale; and
- that they are not granted merely to enable patentees to enjoy a monopoly for the importation of the patented article.¹⁶

Compulsory licensing is granted upon application if, after three years, it is shown that the reasonable requirements of the public with respect to the patented invention have not been satisfied or that the patented invention is not available to the public at a reasonable price. Further, the Act also introduces the notion of licence of right. This implies that the patentee can be forced to grant a licence to a person interested in working the patented invention. While the normal rule is that the licence of right can be granted after three years on grounds similar to compulsory licences, in the case of patents relating to food, medicine or drug, all patents are automatically deemed to fall under this provision.¹⁷ Finally, on similar grounds, the patent can even be revoked.¹⁸

B. THE INTERNATIONAL REGIME CONCERNING THE PROTECTION OF PLANT VARIETIES

1. *Patents and the TRIPS Agreement*

The TRIPS Agreement today constitutes one of the central instruments of the international legal regime concerning intellectual property. In general, it has the effect of extending the application of intellectual property standards already in use in most OECD countries to all General Agreement on Tariffs and Trade (GATT) signatories. In the specific case of patents, the TRIPS Agreement will have wide-ranging implications

¹³ See Section 2 of the Patents Act, 1970.

¹⁴ See Section 53 of the Patents Act, 1970.

¹⁵ See, e.g., Suman Sahai, *Indian Patents Act TRIPS*, 28 Econ. & Pol. Wkly 1495 (1993).

¹⁶ See Section 83 of the Patents Act, 1970.

¹⁷ See Sections 86, 87 and 88 of the Patents Act, 1970.

¹⁸ See Section 89 of the Patents Act, 1970.

for countries like India. It provides, for instance, that patents must be available for inventions, whether products or processes, in all fields of technology. Some general exceptions to patentability are provided.¹⁹ Further, States are allowed to exclude from patentability “plants and animals other than micro-organisms, and essentially biological processes for the production of plants or animals other than non-biological and microbiological processes”. Plant varieties must, however, be given protection either by patents or by an effective alternative system. The latter provision reflects debates concerning the appropriateness of imposing patents on plant varieties and constitutes one of relatively few exceptions to patentability in the TRIPS Agreement.²⁰ Divergences of opinion among negotiators are further reflected in the fact that this provision is to be reviewed in 1999.²¹

A few other characteristics of the TRIPS Agreement must be noted at this juncture. First, while the Agreement entered into force on 1 January 1995, it grants developing countries the right to delay the implementation of the Agreement until 1 January 2000. Least developed countries are granted a ten-year waiver. Second, developing countries, such as India, which provide for restrictions on the granting of product patents have additional obligations. Article 65 allows developing countries to delay until 2005 the extension of product patents on areas of technology not so protected at the time of the entry into force of the TRIPS Agreement for the country in question. However, with regard to product patents concerning pharmaceutical and agricultural chemical products, Article 70 forces such countries to provide a temporary system for the filing of applications for such patents as of 1 January 1995. They must apply the criteria for patentability laid down in the TRIPS Agreement as if those criteria were being applied on the date of filing. Further, when a patent application is submitted, these countries have to provide so-called exclusive marketing rights (EMRs) for five years or until a product patent is granted or rejected. They are under an obligation to do so, provided that a patent application has been filed and patent granted for the same product in another Member State.²²

2. *Plant Breeders' Rights and the International Convention for the Protection of New Varieties of Plants*

Agriculture was traditionally excluded from the international patents regime. It was widely believed that agriculture should not be governed by the patents regime, which

¹⁹ See Article 27.2 of the Agreement on Trade-Related Aspects of Intellectual Property Rights, Marrakesh, 15 April 1994, reprinted in 33 Int'l Legal Mat. 1125 (1994).

²⁰ See also, Susan H. Bragdon and David R. Downes, *Recent Policy Trends and Developments Related to the Conservation, Use and Development of Genetic Resources*, International Plant Genetic Resources Institute, Rome, 1998.

²¹ See, e.g., Daniel Gervais, *The TRIPS Agreement—Drafting, History and Analysis*, Sweet & Maxwell, London, 1998; noting that the patent section of TRIPS was one of the most difficult to negotiate.

²² See Article 70.8–9 of the TRIPS Agreement, *supra*, footnote 19. See also Section 1.D.3, below, for more details on exclusive marketing rights.

was viewed as inappropriate in this context.²³ This was linked to traditional agricultural practices of seed saving and exchange and to the perception that the fulfilment of food needs should not be primarily a profit-making enterprise.²⁴ This hampered the development of a seed industry and more general agricultural businesses. However, business interests progressively obtained the development of a form of legal protection.

At the international level, this was first achieved within the context of the International Convention for the Protection of New Varieties of Plants (UPOV) signed in 1961 among a few Western European nations. Though the UPOV Convention did not introduce patents, it sought from the outset to provide incentives to the private sector to engage in commercial plant breeding by granting them so-called Plant Breeders' Rights (PBRs). More specifically, the Convention recognises the rights of individual plant breeders who have developed or discovered plant varieties which are new, distinct, uniform and stable.²⁵ It seeks to protect new varieties of plants both in the interests of agricultural development and of plant breeders. On the other hand, the Convention recognises what is known as the farmer's privilege. 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 commercialise other new varieties.

The latest version of the Convention, adopted in 1991, has further strengthened PBRs and conversely restricted the farmer's privilege. It extends, for instance, breeders' rights to all production and reproduction of their varieties, and to species as well as general and specific plant varieties. The remaining exceptions to these rights include acts done privately and for non-commercial purposes, experiments, and breeding and exploitation of other varieties. Breeders are now granted exclusive rights to harvested materials and the distinction between discovery and development of varieties has been eliminated.²⁶ Further, the right to save seed is no longer guaranteed. PBRs have in effect become akin to weakened patents and the conceptual distinction between the two is now blurred.

While the UPOV Convention has been ratified by some developing countries, in particular Latin American countries, its membership is still mainly drawn from European countries.²⁷ India has not ratified this Convention.

²³ See, e.g., Jean-Pierre Clavier, *Les catégories de la propriété intellectuelle à l'épreuve des créations génétiques*, L'Harmattan, Paris, 1998.

²⁴ See, e.g., Commission on Genetic Resources for Food and Agriculture, *Possible Formulas for the Sharing of Benefits Based on Different Benefit-Indicators*, Rome, 8th Sess., 19 to 23 April 1999, Doc. CGRFA-8/99/8.

²⁵ See Article 5 of the 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; UPOV Doc. 221(E), 1996.

²⁶ See, e.g., Gurdial Singh Nijar and Chee Yoke Ling, *The Implications of the Intellectual Property Rights Regime of the Convention on Biological Diversity and GATT on Biodiversity Conservation: A Third World Perspective*, in Anatole F. Krattiger *et al.*, eds., *Widening Perspectives on Biodiversity*, International Academy of the Environment, Geneva, 1994, p. 277.

²⁷ As of 23 April 1999, there were 43 Member States to the UPOV Convention.

3. *Farmers' Rights and the International Undertaking on Plant Genetic Resources*

The development of PBRs has been matched by calls for the recognition at the international level of farmers' rights. At present, farmers' rights have only been acknowledged in a non-binding resolution of the Food and Agricultural Organization (FAO) Conference known as the International Undertaking on Plant Genetic Resources.²⁸ No binding treaty has yet recognised these rights. Further, there is widespread disagreement on the nature of the rights. While some contend that they are fundamental rights of farmers, others claim that they are not intellectual property rights since they cannot be ascribed to any specific individual or that such claims can only be realised through the establishment of a fund, a form of benefit sharing.²⁹ As of today, the status of farmers' rights is much hazier than the well defined PBRs. However, the Undertaking is currently being revised. While negotiators have acknowledged the need to define farmers' rights in the proposed new instrument, the negotiations towards a definition have been extremely controversial.³⁰

C. INDIA AND THE TRIPS NEGOTIATIONS

The development of India's position with regard to intellectual property in the Uruguay Round was linked to strong and often diverging domestic and international pressures. For a long time, India was among the countries against the inclusion of intellectual property in the GATT, on the ground that the protection of IPRs had no significant relationship with international trade.³¹ At first, the official position was to reject the inclusion of IPRs in the GATT. Thus, on several occasions between 1987 and 1989, government statements indicate that India believed that IPRs had no direct relationship to trade and that it had no intention of amending its Patents Act. A paper presented by a senior official of the Ministry of Commerce in 1989 stated, for instance, that there should be no attempt to extend developed countries' patent laws to developing countries and that standards which could be relevant to the former may be inappropriate to the latter and should not be imposed on them.³² After the 1991 elections and the return to power of the Congress Party, the new government headed

²⁸ While the original International Undertaking on Plant Genetic Resources, Res. 8/83, *Report of the Conference of FAO*, 22nd Sess., Rome, 5 to 23 November 1983, Doc. C83/REP focused on the concept of the common heritage of humankind, interpretative resolutions adopted in 1989 and 1991 left aside the concept of common heritage and recognised the existence of PBRs and FRs. See *Agreed Interpretation of the International Undertaking*, Res. 4/89, *Report of the Conference of the FAO*, 25th Sess., Rome, 11 to 29 November 1989, Doc. C89/REP; and Annex 3 to the International Undertaking on Plant Genetic Resources, Res. 3/91, *Report of the Conference of the FAO*, 26th Sess., Rome, 9 to 27 November 1991, Doc. C91/REP.

²⁹ On benefit sharing, see further below in Section III.B.4.

³⁰ See, e.g., Revision of the International Undertaking on Plant Genetic Resources—Consolidated Negotiating Text Resulting from the Deliberations During the Fifth Extraordinary Session of the Commission on Genetic Resources for Food and Agriculture, Doc. CGRFA/IUND/CNT/Rev.1.

³¹ See, e.g., V.R. Krishna Iyer, *Peoples' Commission on GATT on the Constitutional Implications on the Final Act Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations*, Centre for Study of Global Trade System and Development, New Delhi, 1996.

³² See A.V. Ganesan, *Intellectual Property Rights—Standard and Principle Concerning its Availability, Scope and Use*, Ministry of Commerce, New Delhi, 28 September 1989, reprinted in Iyer, *ibid.*, at 198.

by Prime Minister Narasimha Rao became much less openly averse to GATT and less defensive of the Patents Act.

The progressive softening of the governmental line over time can be explained in part by strong pressure put on the Indian government by foreign governments. In particular, it is noteworthy that India was targeted in 1989 under the U.S. Omnibus Trade and Competitiveness Act and asked, *inter alia*, to improve patent protection for all classes of invention.³³ Following the failure of the government that was in power at the time to effect any changes, India was declared a “priority country” in 1991. The United States felt that India provided an inadequate level of patent protection for pharmaceuticals, including too short a term of protection and overly broad compulsory licensing provisions. Even though the Rao government subsequently met most U.S. demands, it failed on the pharmaceutical front. This led to a decision by the U.S. Trade Representative to suspend the duty free treatment of US\$ 60 million of pharmaceutical imports from India under the General System of Preferences. There were further demands that India should increase the duration of patents on food and pharmaceuticals, restrict compulsory licensing, restrict licences of right and restrict the right to revoke the patent.³⁴

While strong international pressure was being put on India to accept the TRIPS Agreement and to modify its patent law, strong domestic pressure was also put on the government to reject the Uruguay Round and the TRIPS Agreement in particular. Citizens’ mobilisation culminated, for instance, in a major demonstration in 1993 attended by hundreds of thousands of farmers who rallied against the GATT and demanded the rejection of the Dunkel Draft.³⁵ More recently, a *bija satyagraha* (struggle for the right to seed), echoing the struggle launched by Gandhiji during the anti-colonial struggle, has been initiated by some activists.

In the event, India signed the GATT 1994 Agreement in Marrakesh and became an original member of the WTO. The ratification of the TRIPS Agreement will imply significant changes in the Patents Act and the adoption of new laws. Some of the main changes to be effectuated in the legislation include:

- a system for filing and handling product patent applications for pharmaceutical and agricultural chemical products and the granting of EMRs (to be implemented as of 1 January 1995; adopted in March 1999);
- the elimination of any restriction on the granting of product patents (as of 1 January 2000) except for product patents on pharmaceutical and agricultural chemical products (where restrictions can remain until 1 January 2005);
- the elimination of restrictions on patentable subject matter such as the current exclusion of methods of agricultural or horticulture (as of 1 January 2000);

³³ See, e.g., Aparna Vishwanathan, *Special 301: Analysis of Intellectual Property Dispute Between India and U.S.A.*, 35 J. Indian L. Institute 127 (1993). See also, United States Omnibus Trade and Competitiveness Act, 19 U.S.C. 2242.

³⁴ See, e.g., Vishwanathan, *ibid.*

³⁵ See, e.g., Ulrich E. Loening, *Freedom of Farmers Lost*, The Guardian, 30 November 1993, p. 23.

- the lengthening of patent duration to twenty years, from the current fourteen years, and seven years for food and pharmaceuticals (as of 1 January 2000);
- restrictions and modifications concerning compulsory licensing, licences of right and the right of revocation (as of 1 January 2000); and
- the adoption of a legal regime for the protections of plant varieties (as of 1 January 2000).³⁶ This will probably take the form of a Plant Variety Protection Act.

D. PATENTS-RELATED ISSUES OF SPECIAL RELEVANCE FOR THE PROTECTION OF PLANT VARIETIES

1. *The Protection of Plant Varieties in the TRIPS Agreement*

Article 27.3.b of the TRIPS Agreement states that Member States must “provide for the protection of plant varieties either by patents or by an effective *sui generis* system or by any combination thereof”. It thus constitutes an exception to the general rule, which is that all inventions are to be protected by patents. It reflects conflicting views among negotiators in the Uruguay Round concerning the status that should be given to plant varieties.

The alternative opened to Member States in the form of an “effective *sui generis* system” raises numerous questions because it has never really been defined.³⁷ First, as is clear from the text, the *sui generis* system cannot be akin to patents since this would not be consistent with the text, which clearly shows that States have an alternative. In all likelihood, the alternative system will also be an intellectual property right because it is knowledge which is to be protected.

Second, Article 27.3.b requires the alternative system to be effective. Again, there is no generally agreed upon definition. Some commentators have suggested that the definition of the term effective can be derived from other uses of the term in the TRIPS Agreement. This would imply that an effective *sui generis* system must allow concrete action against any act of infringement of the right available under the system.³⁸ It is, however, clear that the effectiveness of a *sui generis* system cannot be determined only through its enforcement mechanisms. Effectiveness can only be judged by analysing the entire proposed system to see if it provides an adequate level of protection to all actors involved in plant variety protection, use and management. This excludes by definition any limited judgment which overlooks in particular an analysis of the rights themselves.³⁹

Third, it is necessary to examine whether any alternative system is already in existence at the international level. It has been submitted by some commentators that PBRs constitute the only available option and that States can only choose between

³⁶ On the draft plant variety legislation, see further below in Section III.A.2.

³⁷ See, e.g., Dan Leskien and Michael Flitner, *Intellectual Property Rights and Plant Genetic Resources: Options for a Sui Generis System*, International Plant Genetic Resources Institute, Rome, 1997.

³⁸ *Ibid.*

³⁹ Concerning the definition of an “effective *sui generis* system”, see also below in Section IV.B.2.

patents and PBRs.⁴⁰ Up until recently, there were debates concerning the differences between the 1978 and 1991 versions of the Convention. Following the entry into force of the 1991 version of the Convention, accession to the 1978 version is not allowed any longer.⁴¹ Since PBRs have become substantially akin to weakened patents in the 1991 version, the UPOV does not constitute a real alternative to patents. Further, it must be noted that nothing in the TRIPS Agreement indicates that the UPOV regime should serve as a model for a *sui generis* regime.⁴² Other commentators have pointed to farmers' rights as an alternative model.⁴³ While the concept in itself may be developed to constitute an alternative to patents, farmers' rights are still in the process of being defined in the context of the revision of the International Undertaking on Plant Genetic Resources and cannot serve at this juncture as an immediately applicable model.

2. Recent Controversies over Specific Patents

One of the reasons for India's prominence in the debate over patents in general is linked to the controversies created by some specific patent applications. In general, they can be characterised as patents taken on knowledge widely shared in India. They include, for instance, patents on turmeric, neem and basmati which have been quite controversial.

It is worth highlighting two recent cases to illustrate the kinds of practical problems that India as a country and the Indian population are facing with regard to patents. In the case of the patent on turmeric, Suman K. Das and Hari Har P. Cohly applied for a patent on the use of turmeric in wound healing in the United States.⁴⁴ More specifically, 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. This case shows that unwarranted patents can be challenged, but this does not constitute an appropriate avenue to deal with potential bio-piracy because of the difficulties and costs involved in challenging patents in a foreign country.

In the case of the neem tree, a number of patents related to some of the active substances of the tree have been applied for outside of India. These include patents in varied fields, from methods to extract one of the active properties of the neem to

⁴⁰ See, e.g., Biswajit Dhar and C. Niranjan Rao, *Patent Breeders and Farmers in the New Intellectual Property Regime: Conflict of Interests?*, Centre for Study of Global Trade System and Development, New Delhi, 1997. Cf. Gervais, *supra*, footnote 21.

⁴¹ See Article 37 of the UPOV Convention, *supra*, footnote 25.

⁴² Cf. Correa, *supra*, footnote 1.

⁴³ Cf. Martin Girsberger, *The Protection of Traditional Plant Genetic Resources for Food and Agriculture and the Related Know-How by Intellectual Property Rights in International Law*, 1 J.W.I.P. 6, November 1998, pp. 1017 *et seq.*

⁴⁴ U.S. Patent No. 5,401,504; *use of Turmeric in Wound Healing*, issued 28 March 1995.

preparations of neem-based insect-repellent products.⁴⁵ It is widely acknowledged that Indian people and farmers have known and used the neem tree for generations.⁴⁶ Its varied properties have been used, for instance, by millions of farmers to make a pesticide. In recent decades, the properties of the neem tree have been the object of substantial attention and large-scale research has been carried out to turn some of the neem's properties into commercially viable products. Since the end products of this research are often used in ways that are similar to traditional uses, this has created tensions and resentment on the part of the local population. It is noteworthy that neem is an extremely common tree in India but has up until recently been known mainly in South Asia and a handful of other countries.

3. *The Controversy over Exclusive Marketing Rights*

As noted above, countries whose laws do not allow product patents for pharmaceutical and agricultural chemical products can delay their introduction up until 2005 but are required to provide a filing system for product patents ("mailbox") and exclusive marketing rights (EMRs). For developing countries, this is governed by Articles 65 and 70 of the TRIPS Agreement.

The Indian Patents Act of 1970 includes restrictions on the granting of product patents in the pharmaceutical and agricultural fields. India is thus entitled to delay the introduction of product patents up until 2005, but was required to introduce the so-called mailbox system and EMRs as of 1 January 1995. The government tried to submit a proposal for amending the Patents Act to be in compliance by January 1995. However, the bill failed to pass in the Council of States (*Rajya Sabha*). This led to the promulgation of the Patents (Amendment) Ordinance 1994 on 31 December 1994 to amend the Patents Act to provide filing and handling of patent applications for pharmaceutical or agricultural chemical products. Under Indian law, the Ordinance was of temporary validity and expired in March 1995.

The failure of Parliament to adopt an amendment to the Patents Act after the expiration of the Ordinance had significant consequences. Indeed, the U.S. government filed a complaint with the WTO Dispute Settlement Body alleging that India did not have in place a mailbox system corresponding to the requirements of Article 70.8 of the TRIPS Agreement. Although India argued that despite the lack of appropriate legislation, in practice it was offering a mailbox, the Panel decision concluded that:

"India has not complied with its obligations under Article 70.8(a) and, in the alternative, paragraphs 1 and 2 of Article 63 of the TRIPS Agreement, because it has failed to establish a

⁴⁵ See, e.g., U.S. Patent No. 5,827,521; *Shelf Stable Insect Repellent, Insect Growth Regulator and Insecticidal Formulations Prepared from Technical Azadirachtin Isolated from the Kernel Extract of Azadirachta Indica*, issued 27 October 1998; U.S. Patent No. 5,695,763; *Method for the Production of Storage Stable Azadirachtin from Seed Kernels of the Neem Tree*, issued 9 December 1997.

⁴⁶ See, e.g., National Research Council, *Neem—A Tree for Solving Global Problems*, National Academy Press, Washington D.C. 1992; and Michael D. Lemonick, *Seeds of Conflict: Critics Say a U.S. Company's Patent on a Pesticide from an Indian Tree is "Genetic Colonialism"*, *Time*, Vol. 146, No. 13, 25 September 1995, p. 50.

mechanism that adequately preserves novelty and priority in respect of applications for product patents in respect of pharmaceutical and agricultural chemical inventions during the transitional period to which it is entitled under Article 65 of the Agreement, and to publish and notify adequately information about such a mechanism; and that India has not complied with its obligations under Article 70.9 of the TRIPS Agreement, because it has failed to establish a system for the grant of exclusive marketing rights."⁴⁷

A second complaint on the same issues was filed by the EU which requested in September 1997 the establishment of a Panel. This Panel again stated in its August 1998 Report that India had not complied with its obligations under Article 70.8(a) and 70.9.⁴⁸

Following the adoption of the first report, it was agreed between India and the United States that India should be given until April 1999 to implement the conclusions of the report. This prompted the government to take further action concerning the revision of the Patents Act which will be analysed in Section III below.

4. *Patents and Local Knowledge*

One of the growing points of contention at the domestic and international levels relates to the patenting of knowledge which does not qualify as state-of-the-art. As alluded to, patents can only be granted for inventions. This is usually taken to mean state-of-the-art knowledge and most often implies technological discoveries in laboratories, universities or private or public companies. Innovation carried out by other actors does not easily qualify for patent protection. This local knowledge, sometimes referred to as traditional knowledge, includes, for instance, the accumulated and growing knowledge of farmers concerning seeds, soils and, more generally, environmental management. It also includes all the knowledge linked to biological resources used to produce medicines.⁴⁹

Since local knowledge does not qualify for patent protection, it is part of public-domain knowledge that can be freely appropriated by anyone.⁵⁰ Even though the Biodiversity Convention addresses the issue of benefit-sharing, it is still premature to talk of binding international provisions concerning the sharing of benefits arising from the commercial exploitation of local knowledge with the actual holders of the knowledge.⁵¹

⁴⁷ *India—Patent Protection for Pharmaceutical and Agricultural Chemical Products* (U.S. complaint), Report of the Panel, 5 September 1997, WTO Doc. WT/DS50/R. See also, *India—Patent Protection for Pharmaceutical and Agricultural Chemical Products* (U.S. complaint), Report of the Appellate Body, 19 December 1997, WTO Doc. WT/DS50/AB/R.

⁴⁸ *India—Patent Protection for Pharmaceutical and Agricultural Products* (EC complaint), Report of the Panel, 24 August 1998, WTO Doc. WT/DS79/R.

⁴⁹ While the latter does not constitute the main focus of this article, the problems highlighted here apply in large measure also to medicinal uses of biological resources.

⁵⁰ See, e.g., N.S. Gopalakrishnan, *Impact of Patent System on Traditional Knowledge*, XXII Cochin U.L. Rev. 219 (1998).

⁵¹ Cf. Article 8 of the Convention on Biological Diversity, Rio de Janeiro, 5 June 1992, reprinted in 31 Int'l Legal Mat. 818 (1992).

The concerns associated with the use of local knowledge are well illustrated in the case of bio-prospecting. Bio-prospecting for substances which have useful medicinal properties and research to produce new varieties of plants have dramatically increased in the last decade. This has the potential to create conflicts between different actors since the knowledge used by generally large companies to manufacture patented products cannot be equated with a discovery. Indeed, bio-prospectors often rely substantially on local people with special knowledge of plants found in their localities to identify potentially useful plants. To avoid the accusation of bio-piracy, various schemes have been proposed to adapt the patent regime to these new situations where the patented invention derives from other knowledge.

II. THE PROTECTION OF PLANT VARIETIES AND FARMERS

A. THE CONTEXT

1. *Agriculture in India*

Agriculture still represents a fundamental economic activity in India. Though its share of GDP has declined to 29 percent, it employs 64 percent of the working population. Further, a number of industries, such as the cotton and jute textile industries or the sugar industry, are directly based on agricultural goods.⁵² Agricultural products such as tea, oilseeds or tobacco also constitute one of the main sources of exports. It is noteworthy that agriculture is a commercial activity only in some small pockets but a livelihood for a large section of the farming community.⁵³

Two main kinds of agricultural management can be identified. The first may generally be referred to as traditional agriculture. It implies agricultural practices which see soil management as a comprehensive activity and which take into account not only yields but also other elements such as the long-term productivity of the soil and the management of pests. The second is often known as chemical agriculture. This refers to a kind of agriculture which emphasises high yields and where soil management is geared mainly towards this aim. It includes, for instance, the use of chemical fertilisers and pesticides. In India, chemical agriculture has become well-known following the advent of the Green Revolution. The latter refers to the introduction of new agricultural management techniques in the late 1960s. It included primarily so-called High-Yielding Varieties (HYVs) which require the application of a number of external inputs, from irrigation to large doses of chemical fertilisers and chemicals. The introduction of these new varieties had a definite impact on yields,⁵⁴ even though maldistribution of food in the country remains a significant problem to date. Despite increases in yields, the Green Revolution has come to be more and more criticised. Critiques include both the fact

⁵² See, e.g., Abha Lakshmi Singh and Shahab Fazal, *Agriculture and Rural Development*, B.R. Publishing, Delhi, 1998.

⁵³ See, e.g., Suman Sahai, *Government Legislation on Plant Breeders' Rights*, 29 *Econ. & Pol. Wkly* 1573 (1994).

⁵⁴ See, e.g., Rita Sharma and Thomas T. Poleman, *The New Economics of India's Revolution—Income and Employment Diffusion in Uttar Pradesh*, Vikas, Delhi, 1994.

that yield gains may not be sustainable in the long term and the fact that soil quality, access to irrigation water and other biophysical agroclimatic conditions have been formidable barriers to the adoption of HYVs.⁵⁵

2. *Seeds in Agricultural Management*

Three main actors can be identified in seed management. These are farmers, the government and the private sector. While in theory they all have similar goals, in practice there appear to be significant areas of conflict among them.

(a) *Farmers*

Farmers have traditionally been the main actors involved in saving seeds, selecting specific traits to produce varieties suiting their requirements and generally managing agro-biodiversity. Their importance in seed management at present can, for instance, be ascertained by looking at figures concerning the percentage of seeds sown which are saved seeds from the previous crop. Estimates put this at between 75 percent and 85 percent.⁵⁶ It is noteworthy that the percentages of seed supplied by the seed industry varies widely according to the crop. While the industry provides only about 12 percent of paddy and 8 percent of wheat seeds, it provides about 29 percent of maize and 72 percent of pearl millet.⁵⁷ It is thus apparent that farmers still provide the overwhelming majority of seeds for some of the staple crops. Estimates indicate that inter-farmer sales of seeds account for 60 percent of seed requirements of agriculture in India.⁵⁸ This is due in part to the fact that open-pollinated crops such as paddy and wheat can less easily be hybridised.

One important characteristic of farmers' seed management is the practice of exchanging seeds with each other. This can take different forms depending on the regions. The transaction can, for instance, involve the obligation for the recipient to give back after the harvest an equivalent or higher quantity of seeds. In some regions, the tradition of seed saving, seed enhancement and seed exchange is stronger than elsewhere. One such region is the Garhwal region presently located in northwest Uttar Pradesh in the lower Himalayas. This region is well known for its *Chipko* movement initiated in the 1970s, which sought to preserve the trees of the region from commercial loggers.⁵⁹ While *Chipko* is known for its struggle to preserve trees, the movement had broader goals which included the promotion self-reliant sustainable development for the

⁵⁵ See, e.g., Gordon R. Conway and Edward B. Barbier, *After the Green Revolution—Sustainable Agriculture for Development*, Earthscan, London, 1990.

⁵⁶ See, e.g., Suman Sahai, *What is Bt and What is Terminator?*, XXXIV/3-4 Econ. & Pol. Wkly 84 (1999); and Vandana Shiva and Tom Crompton, *Monopoly and Monoculture—Trends in Indian Seed Industry*, XXXIII/39 Econ. & Pol. Wkly A-137 (1998).

⁵⁷ See, e.g., Shiva and Crompton, *ibid.*

⁵⁸ See, e.g., Sahai, *supra*, footnote 15.

⁵⁹ See, e.g., Sunder Lal Bahuguna, *Echoes from the Hills*, Chipko Information Centre, Silyara, Tehri-Garhwal, 1992.

region. In this context, seed saving was taken up by a group of farmers in the late 1980s who now work under the banner of the *Beej Bachao Andolan* (Save the Seeds Movement).⁶⁰ It includes about ten farmers in different areas who work independently. The premise for their work 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, although they may market the products of the crop obtained with these seeds. The seed collections of Vijay Jardhari, one of the members of the group, include about forty varieties of rice, forty varieties of pulses, and one hundred-forty varieties of beans. While many farmers save and enhance seeds on a completely informal basis, the *Beej Bachao Andolan* is noteworthy for its attempt to broaden the purview of this type of activity.

In Tamil Nadu, the Green Foundation is working along the same lines. The Foundation, however, focuses on areas which do not have strong traditions of seed collection. It thus concentrates on reviving the concept of a community-owned seed supply and on initiating processes, from seed collection, storage and multiplication to evaluation.⁶¹ In this case, the initial push clearly comes from outsiders, but the aim is for the role of the Foundation to be limited in time. The Foundation focuses on on-farm conservation, namely in the specific conditions where varieties are grown.⁶² The seed management system proposed focuses on giving farmers access to seed collections rather than commercial breeders, strives to produce heterogeneous and varied varieties with specific or local adaptability, emphasises community seed supply as an important component of sustainable agriculture, focuses on the integration of many individual cultivars, and gives priority to meeting subsistence and food needs.⁶³

These limited examples do not represent the full extent of seed collection systems in India but highlight the diversity of strategies which are applied by farming communities.

(b) *The government*

The government has historically had an important role in the development of new seeds. The seed sector comprises two national level corporations, the National Seeds Corporation and the State Farms Corporation of India, and thirteen state seed corporations. Further, a Department of Agricultural Research and Education responsible for coordinating research and educational activities in agriculture was set up in 1973 in the Ministry of Agriculture. Within this Department, the Indian Council for Agricultural Research has played a key role in developing agricultural technologies.

The prominent role of the government in this field has, however, tended to decline

⁶⁰ The following information on the *Beej Bachao Andolan* is based in part on information provided by Vijay Jardhari of Jardar Village in Tehri-Garhwal. See also, Indira Khurana, *The Seed Supremo*, 7/15 Down to Earth, 31 December 1998.

⁶¹ See, e.g., Green Foundation, *On-Farm Conservation of Seed Diversity*, Green Foundation, Bangalore, 1998.

⁶² See, e.g., Vanaja Ramprasad, et al., *Seeds of the Future*, Green Foundation, Bangalore, 1997.

⁶³ Green Foundation, *supra*, footnote 61.

in the last decade. Indeed, the introduction of the new seed policy and, more generally, the introduction of the new economic policy in 1991 have had significant impacts in the seed sector. There have, for instance, been attempts to stimulate the development of the seed industry. This has been accompanied, for instance, by calls for sizeable cuts in agricultural input subsidies, such as the fertiliser subsidy.⁶⁴

The involvement of the government in seed matters is significant in the larger context of the introduction of a legal protection on plant varieties. In principle, governmental intervention is based on the principle that it is a service to the community at large with the main aim of increasing food security for the country as a whole. Thus, the rationale is not profit and this kind of intervention is not dependent upon monopoly rights such as patents since it is premised on the enhancement of people's overall welfare.

Critiques of governmental intervention have, however, argued that scientists working in agricultural research often see a strong division between research and extension, and research is not always geared primarily towards generating technologies which can be easily adopted by farmers.⁶⁵

(c) *The seed industry*

The seed industry in India for a long time developed mainly in the shadow of government action in this field. While the development of a private seed industry was not banned, it was not strongly promoted, partly because of the perceived need to keep this vital sector premised on the common good rather than on profits.

In the last decade, there has been a significant expansion of the private sector. Today, the seed industry comprises about one hundred major seed companies.⁶⁶ This new strength has been matched by stronger calls for the development of property rights on plant varieties. Thus, the pressure put on the government to introduce PBRs or similar rights is attributable in part to the TRIPS Agreement but also to the domestic private industry which sees the lack of legal protection as a major restriction on commercial hybrid production.⁶⁷

B. IMPACTS OF THE PROTECTION OF PLANT VARIETIES ON AGRICULTURAL MANAGEMENT

The impacts of the introduction of a form of legal protection on plant varieties for farmers' agricultural practices is difficult to analyse. This is due to several factors. First, while a patent on a plant does not directly restrict the rights of farmers to save seeds, it

⁶⁴ See, e.g., Sunil Kumar Batra, *Indian Agriculture and New Economic Policy: Impact of Agro Industry*, Indian Social Institute, Delhi, 1995.

⁶⁵ See, e.g., Anonymous, *Public Sector Agricultural Research*, in John Farrington and S. Satish, eds., *Sustainable Agriculture—NGOs, GOs and the Rural Poor*, Booklinks, Hyderabad, 1995.

⁶⁶ See Ministry of Information and Broadcasting, *India 1998—A Reference Annual*, Government of India, Delhi, 1998.

⁶⁷ See, e.g., Biswajit Dhar and Sachin Chaturvedi, *Introducing Plant Breeders' Rights in India—A Critical Evaluation of the Proposed Legislation*, 1 J.W.I.P. 2, March 1998, pp. 245 *et seq.*

forms part of a wider web of relationships which are closely inter-related. Second, property rights on plant varieties are only in the process of being introduced in India and thus have not yet impacted on agricultural management. However, this will change after the entry into force of the TRIPS Agreement.

This Section emphasises the direct and indirect impacts of the introduction of monopoly rights in agriculture and shows that the introduction of these rights does not seem to favour farmers' sustainable management of their land. On the contrary, patents and PBRs seem to provoke the displacement of local seeds together with a loss of agrobiodiversity and a host of other problems for small farmers. This calls for the development of an alternative form of property rights.

1. *Impacts on Farmers' Seed Management*

The introduction of patents or PBRs is likely to have a number of impacts on farmers' agricultural practices and farmers' lives. First, it has the potential to conflict with established agricultural management practices of farmers. This is due to the fact that two systems rely on and promote different knowledge systems, identify innovations differently and reward inventors in different ways. More generally, while the reward established by patents and PBRs are mainly financial, it is clear that established management practices do not concentrate exclusively on financial incentives for innovation.

The conflict between the different practices is, for instance, apparent in the very definition of PBRs. A variety tended by farmers stands virtually no chance of meeting the conditions laid down by the UPOV Convention to define novelty. If novelty is not granted, the farmer cannot be recognised as a breeder.⁶⁸ This explains why the PBR system is often criticised for only recognising one very specific kind of 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 PBRs and patents do not recognise as scientific knowledge worthy of protection the scientific or technical knowledge of farmers and other local actors.⁶⁹

Second, while generalisations are extremely difficult to make, it is clear that farmers' knowledge is often less individualistic than scientific knowledge produced in laboratories. Even if it is possible to identify one specific individual having made a specific contribution to a given technical or scientific development, it is in most cases unlikely that he or she will be the exclusive inventor. This is one reason why monopoly rights which channel all the benefits to a single inventor are not adequate, since they marginalise or even negate the contribution of the different actors present and will inevitably limit or stop free access to the invention by other users. Furthermore, even

⁶⁸ Cf. M.V. Rao, *Viewpoint of Public Sector Plant Breeding Institutions*, in Swaminathan, *supra*, footnote 2.

⁶⁹ Cf. Naomi Roht-Arriaza, *Of Seeds and Shamans: The Appropriation of the Scientific and Technological Knowledge of Indigenous and Local Communities*, 17 *Michigan J. Int' L.* 919 (1996).

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.⁷⁰

Third, patents in agriculture generally foster the commercialisation of a number of major agricultural inputs. One of the most direct impacts of patents is to raise the price of patented seeds compared to other seeds. Furthermore, while patents on seeds only give patentees rights on seeds, impacts are in practice far more wide-ranging. Farmers become dependent on private firms not only for their seeds but also for such other inputs as pesticides and fertilisers.⁷¹ This is most easily visible in recent biotechnology developments where some firms have developed seeds which are pre-disposed to react favourably to the application of a herbicide produced by the same firm.⁷² As shown by the example of some countries, patenting in agriculture may eventually lead to the integration of a majority of steps in the food production system.⁷³

Fourth, patents on plant varieties may have significant indirect impacts on the preservation of biodiversity. In general, patented varieties have the tendency to displace local varieties and to foster monocultures.⁷⁴ This leads in turn to a loss of agrobiodiversity in cases where farmers stop maintaining existing local varieties.

2. *The Green Revolution in Perspective*

The introduction of the Green Revolution was premised on principles which differ completely from the rationale for the introduction of patents on plant varieties. Indeed, HYVs were the outcome of public research efforts based on the principle of free exchange of germ plasm with a view to foster 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 mainly seeks to make a profit, one of the major incentives for its participation being the availability of patents, PBRs or similar rights.

Despite the different premises, a number of lessons can be learned from the experience accumulated over the past three decades. This is due to the fact that, in practice, while the motives may be different, impacts are in large part similar.⁷⁵ The Green Revolution package, like the introduction of patented varieties, tends to lead to a loss of seed diversity. The two also focus mainly on yield enhancement. Furthermore, they both lead to the diminution of the farmer's ability to save seeds. In the case of hybrid seeds, farmers are not technically bound to purchase new seeds each year, but the

⁷⁰ Id.

⁷¹ See, e.g. Vandana Shiva, *Future of our Seeds, Future of our Farmers—Agricultural Biodiversity, Intellectual Property Rights and Farmers' Rights*, Research Foundation for Science, Technology and Natural Resource Policy, New Delhi, 1996.

⁷² See, e.g., Joseph Mendelson, *Roundup: The World's Biggest-Selling Herbicide*, 28/5 *Ecologist* 270 (1998).

⁷³ See, e.g., Neil 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).

⁷⁴ See, e.g., Sahai, *supra*, footnote 56.

⁷⁵ Cf. Laura L. Jackson, *Agricultural Industrialization and the Loss of Biodiversity*, in Lakshman D. Guruswamy and Jeffrey A. McNeely, eds., *Protection of Global Diversity: Converging Strategies*, Duke University Press, 1998, p. 66.

yield of saved seeds is clearly much lower, even in the second year. This thus constitutes a very strong incentive for yearly purchases. In the case of patented varieties, farmers are not supposed to replant saved seeds. In practice, in a country like India, most small farmers will be able to carry on the practice of saving seeds because, unlike in the United States, where agriculture is mostly a large-scale activity, litigation of the millions of small farmers by seed companies is simply not feasible.⁷⁶ This loophole may, however, soon disappear if seed companies manage to produce seeds for staple foods with the so-called terminator technology.⁷⁷

The introduction of the Green Revolution package has significant impacts for farmers and agricultural management. Indeed, one of the main problems associated with HYVs is that they perform well only when all the necessary inputs are available in sufficient quantities.⁷⁸ Thus, if water is not provided at the opportune time in sufficient quantity, the crop may fail to produce the desired results. Consequently, in the case of paddy, for instance, the introduction of hybrids must be accompanied by reliable irrigation. Small farmers who may not have access to year-long irrigation water seem to be wary of HYVs. Since the yields can only be guaranteed if all the inputs are satisfactorily provided, when this cannot be achieved in each and every season, farmers may prefer to plant only part of their fields with these varieties and sow the rest with local seeds. The latter are likely to yield less but be capable of producing a more or less stable output independent of seasonal climatic fluctuations.

The Green Revolution package has come under increasing criticism in the last decade.⁷⁹ 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, waterlogged and saline soils from many large irrigation schemes, declining soil fertility with excessive chemical fertiliser use and water pollution with pesticides.⁸⁰ Second, the sustainability of the yield increases has been questioned in view of evidence of diminishing returns on intensive production with HYVs.⁸¹ Third, the application of the new technique necessitates important investments in seeds, fertilisers, pesticides and irrigation which are beyond all but the biggest farmers.⁸²

III. INDIAN RESPONSES TO THE TRIPS AGREEMENT

As noted, the ratification of the TRIPS Agreement and the other components of the

⁷⁶ See, e.g., Shiva and Crompton, *supra*, footnote 56.

⁷⁷ See, e.g., U.S. Patent 5, 723, 765; *Control of Plant Gene Expression*, issued 3 March 1998.

⁷⁸ See, e.g., Conway and Barbier, *supra*, footnote 55.

⁷⁹ See, e.g., Vandana Shiva, *The Violence of the Green Revolution*, Zed Books, London, 1991.

⁸⁰ See, e.g., Bina Agarwal, *Gender Environment and Poverty Interlinks in Rural India*, United Nations Research Institute for Social Development (UNRISD), Geneva, 1995, p. 7; and G.S. Dhaliwal and V.K. Dilawari, *Impact of Green Revolution on Environment*, in B.S. Hansra and A.N. Shukla, eds., Classical Publishing, Delhi, 1991.

⁸¹ See, e.g., Conway and Barbier, *supra*, footnote 55.

⁸² See, e.g., B.H. Joshi, *An Analytical Approach to Problems of Indian Agriculture: A Theoretical and System Approach*, B.R. Publishing, Delhi, 1992.

GATT 1994 Agreement have been extremely contentious. In recent months, the streamlining of domestic legislation to bring India into compliance with the international obligations it has subscribed to has been the subject of significant public debate and media coverage. The impacts of the strong opposition to the TRIPS Agreement, and patents in particular, in some sections of the public have already had significant impacts. It has, for instance, taken the government more than four years to push legislation through Parliament to bring India into compliance with the single provision of the TRIPS Agreement it had to implement as of 1995. It has not even tried to introduce bills concerning changes which must be implemented as of 2000.⁸³ Outside the government, opposition to patents has led a number of people and groups to propose either alternatives to the regimes proposed by the government or to propose ways to fight the intellectual property system which they believe will inevitably come into force soon.

Both governmental and most non-governmental proposals in the field of plant variety protection are driven in large part by the evolution of the international legal regime. The positions adopted are thus in most cases defensive. It is noteworthy that a number of the anti-TRIPS proposals focus on exploiting the patents system for the benefit of different actors but do not concentrate on defining alternatives to the proposed international framework, even where they are available.⁸⁴

This Section focuses first on proposed legislative changes to allow India to be in conformity with its international obligations under the TRIPS Agreement, especially with regard to plant variety protection. In the second part, proposals by other actors concerning plant variety protection are examined.

A. GOVERNMENTAL LEGISLATIVE PROPOSALS

In the field of plant variety protection, the efforts of the government have up until now focused on modifying the Patents Act to be in compliance with the commitments it had to implement by 1995. Apart from these and other amendments to the Patents Act, the government is also in the process of drafting legislation concerning the protection of plant varieties and biodiversity. These different pieces of legislation should not be seen in isolation since each intersects with the other. In practice, however, patents are dealt with in the Ministry of Industry and Commerce, plant variety in the Ministry of Agriculture and biodiversity in the Ministry of Environment and Forests. Up until now, this seems to have precluded effective co-operation in the drafting of the different acts.

Government proposals are marked by two major characteristics. First, they are extremely conservative in the sense that they try to preserve the present status quo in the various areas concerned as far as possible, while taking into account India's

⁸³ Cf. Biswajit Dhar, *WTO-Mandated Changes in the Patents Act*, *Econ. Times*, 7 May 1996, p. 6.

⁸⁴ Cf. C.S. Rangachari and Duvvari Subbarav, *Biodiversity & IPR: Ethical Dimension*, *Econ. Times*, 17 March 1998.

international commitments and the necessity to adapt laws. Second, the various governments which have been in power since 1993 in Delhi have all tried to avoid as far as possible the introduction of what will necessarily be extremely controversial pieces of legislation. This is borne out by the reluctance of the last government to submit more than the strict minimum to Parliament in the case of the 1999 amendment to the Patents Act to comply with the decision of the WTO dispute settlement body.

1. *Amendments to the Patents Act*

As noted above, India will have to effectuate a number of changes to the Patents Act to be in compliance with the TRIPS Agreement. While the Act had been left relatively untouched until 1994, the ratification of the TRIPS Agreement has signalled the beginning of an era of turmoil. It was already alluded to above that the Government unsuccessfully tried to have an amendment passed in 1994.⁸⁵ Following the WTO cases, the government tried again to submit a similarly worded amendment to Parliament in December 1998. Following its failure to see the amendment through by the end of the winter session of Parliament, the government promulgated in January 1999 another temporary ordinance providing for the establishment of a mailbox system and EMRs.⁸⁶ Finally, hardly more than a month before the 19 April deadline for compliance with the WTO decision, both houses of Parliament adopted the amendment.⁸⁷

The Patents (Amendment) Act introduces a new sub-section to Section 5 which prohibits product patents on medicines or drugs. The new clause provides that:

“Notwithstanding anything contained in Sub-section (1), a claim for a patent of an invention for a substance itself intended for use, or capable of being used as medicine or drug, except the medicine or drug specified under Sub-clause (v) of Clause (1) of Sub-section (1) of Section 2, may be made and shall be dealt, without prejudice to other provisions of this Act, in the manner provided in Chapter IV(A).”⁸⁸

The Amendment also adds a new Chapter IV(A) which determines the procedure for the granting of exclusive marketing rights.

2. *Proposed Plant Variety Protection and Farmers' Rights Act*

Efforts have been made to draft an act on the protection of plant varieties but no draft has yet been submitted to Parliament. The bill has already gone through several revisions since the first draft of 1994. In its current form, the plant variety legislation is supported by the domestic seed industry which sees it as the only avenue to foster a greater involvement of the private sector in seed research in particular.⁸⁹

⁸⁵ See above, Section 1.D.3.

⁸⁶ See, e.g., Anonymous, *Promulgation of Patents Ordinance Cleared*, Businessline, 6 January 1999, p. 1.

⁸⁷ See, e.g., *Lok Sabha Passes Patents Bill*, The Hindu, 11 March 1999, p. 1; and *RS Approves Patents Bill*, The Hindu, 14 March 1999, p. 1.

⁸⁸ Patents (Amendment) Act, 1999, Gazette of India, 26 March 1999.

⁸⁹ See, e.g., Deepak Mullick, *Viewpoint of the Plant Breeding Industry*, in Swaminathan, *supra*, footnote 2.

The latest text available is in clear regression compared to the 1994 version, for instance concerning farmers' rights, and is far from constituting an original *sui generis* system.⁹⁰ Rather, it goes a long way towards establishing a regime similar to that proposed by the UPOV Convention. The Act proposes that protection should be available under the Act only for varieties which conform to the criteria of novelty, distinctness, uniformity and stability. Further, the draft explicitly states that, to be protected, the new variety must be clearly distinct by at least one essential characteristic from wild relatives and traditional cultivars.⁹¹

Although this Act purports to include farmers' rights in its scope, farmers seem to be completely outside its purview. Indeed, it is, for instance, apparent that farmers' established varieties which will be viewed under the Act as traditional cultivars will not be granted any protection under the act. In general, farmers are thus seen as cultivators and managers of agro-biodiversity but not as breeders. The only concession made to farmers is to be found at Article 17 which states that:

"Nothing shall affect the farmer's traditional rights to save, use, exchange, share and sell his farm produce of the protected variety except sale for reproductive purpose under commercial marketing arrangements."

This can hardly be seen as a positive contribution to the recognition of farmers' rights since it, in effect, reduces existing rights to a trickle of rights so basic, like the right of the farmers to sell their farm produce, that they are beyond questioning.

Despite being extremely conservative with regard to the rights of non-commercial breeders, the draft may still create conflicts with the TRIPS Agreement. The draft, using language found in the Patents Act, authorises the central government to resort to compulsory licensing in the public interest. This can be done where the reasonable requirements of the public for seeds and the propagating material of a variety are not being met or where the production of the seeds or planting material of the protected variety is not being facilitated to the fullest extent that is reasonably possible without undue delay.⁹²

3. *Proposed Biological Diversity Act*

The Biological Diversity Act is not in itself called for by the TRIPS Agreement. It is being proposed in response to India's ratification of the Biodiversity Convention. However, there are strong linkages between this Act and the other two outlined above. Indeed, the definition of property rights over biological resources and the arrangements for access to the resources cannot be dissociated from the IPR regime to be adopted.

The current draft of the Act devotes a number of provisions to institutional arrangements, and in particular to the setting up of a National Biodiversity Authority

⁹⁰ Concerning the 1994 version, see, e.g., Dhar and Chaturvedi, *supra*, footnote 67.

⁹¹ Article 6.i.A.c of the Outline of the Proposed Legislation on Protection of Plant Varieties (on file with the author).

⁹² *Ibid.*, Article 22.

which would, for instance, have the power to prohibit any foreign person or foreign legal entity from obtaining any biological resource for research, commercial utilisation or bio-prospecting without prior approval of Authority.⁹³ The Authority is further charged with a significant role concerning the sharing of benefits arising out of the exploitation of biological resources.

Overall, the current draft is not comprehensive in scope. However, several elements can be noted. First, the Act gives most powers concerning the management of biological resources to a governmental body in Delhi. This implies a monopoly of power in this field at the Centre. Second, the Act focuses on the enhancement of India's position as a country in the international area. It mainly seeks to ensure that the Indian government can assert its sovereign rights over its biological resources. Hardly any mention is made of other actors, such as *panchayats* (institutions of self-government for the rural areas) or individual farmers. Third, the Act proposes to establish a National Biodiversity Fund. Even if the Fund does indeed seek to channel benefits "to the conservers of biological resources, creators and holders of knowledge",⁹⁴ the very concept of the Fund is subject to criticism. Indeed, the Act would enshrine a principle that creators and holders of knowledge do not have rights to their knowledge. Their only reward is a potential financial contribution from this Fund to be decided by higher authorities.

B. OTHER PROPOSALS AND PRACTICAL EXPERIMENTS

Non-governmental actors have been very active in this field for several years. Some are extremely critical of the current international trade regime, others call for India's withdrawal from the WTO and many criticise the commercialisation of biological resources as a vector for ensuring the sustainable exploitation of the resources.⁹⁵ However, most of the proposals surveyed in this Section focus on patents. Some try to extend the benefits of the patents system to new actors while others strive to lessen the consequences of extending patents to biological resources, but surprisingly few have even taken up the challenge of devising a *sui generis* regime as currently allowed by the TRIPS Agreement. The extension of the patents regime to India is thus often taken as a given.⁹⁶ In other words, the TRIPS Agreement is accepted as a given of the international and domestic legal orders and critics often focus on defending India's position within the regime in place.⁹⁷ The possibilities opened by Article 27.3.b of the TRIPS Agreement are often not taken into account.

The following Sub-sections focus on the different types of responses that have been

⁹³ Article 11 of the Outline of the Proposed Biological Diversity Act, June 1998 (on file with the author).

⁹⁴ *Ibid.*, Article 17.i.

⁹⁵ See, e.g., Rangachari and Subbarav, *supra*, footnote 84.

⁹⁶ Cf. Madhay Gadgil, *A Framework for Managing India's Biodiversity Resources in the Context of CBD and GATT*, 1/1 R1S Biotechnology & Dev. Rev. 1 (1997).

⁹⁷ See, e.g., Karnataka Planning Board, *Report of the Subgroup on Biodiversity*, 1996, (on file with the author).

proposed to the current challenges while Section IV concentrates on further avenues that could be explored.

1. *Using the Exceptions in the TRIPS Agreement*

The TRIPS Agreement provides some exceptions which may be used to limit the impact of the Agreement on some of the most vulnerable actors, such as small farmers. It provides, for instance, that:

“The protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare, and to a balance of rights and obligations.”⁹⁸

It also allows Members to adopt measures necessary to protect public health and nutrition, and to promote the public interest in sectors of vital importance to their socio-economic and technological development.⁹⁹ It is, however, noteworthy that these measures must remain consistent with the general framework of the TRIPS Agreement. This therefore implies a relatively short margin of appreciation for Member States.

In the case of patents, the TRIPS Agreement gives Member States the possibility to exclude inventions from patentability to protect public order or morality; to protect human, animal or plant life or health; or to avoid serious prejudice to the environment.¹⁰⁰ It is usually acknowledged that these exclusions should be read narrowly.¹⁰¹

Some commentators have proposed to interpret current Indian legislation in the context of these exceptions. It has, for instance, been argued that Section 3 of the 1970 Patents Act, which restricts the patentability of a number of inventions, could be justified under Article 27.2 of the TRIPS Agreement.¹⁰² Others have argued that the goals of the international patents system should be broadened and should recognise that the interests of the whole population should take precedence over commercial interests.¹⁰³

The use of the exceptions provided by the TRIPS Agreement may help to make the patents regime more responsive to environmental or social issues. However, the limited scope of these exceptions does not provide effective guidance for the development of a *sui generis* system.

⁹⁸ Article 7 of the TRIPS Agreement, *supra*, footnote 19.

⁹⁹ See *ibid.*, Article 8.

¹⁰⁰ See *ibid.*, Article 27.2.

¹⁰¹ See, e.g., Gervais, *supra*, footnote 21.

¹⁰² See, e.g., V. Manoj, *Patents on Life, India and the TRIPS Mandate*, XXXIII Econ. & Pol. Wkly 152 (1998).

¹⁰³ See, e.g., National Working Group on Patent Laws, *Third World Patent Convention—New Delhi Declaration: Towards a Third World Convention on Intellectual Property Rights and Obligations (IPRO)*, National Working Group on Patent Laws, Delhi, 1990.

2. *Extension of Patents to Local Groups*

Some proposals have been made to extend patent protection to persons and groups which are not in a position to take advantage of the current system. As a broad generalisation, it may be said that these proposals do not question the patents system itself, they only seek to broaden its purview to new actors. The rationale for doing so is to stop normal patentees such as multinational companies which acquire monopoly rights on inventions realised by others.

(a) *The proposed Biodiversity (Rights and Protection) Bill*

The Biodiversity (Rights and Protection) Bill, 1998 proposes the establishment of biodiversity-related community intellectual rights.¹⁰⁴ The stated premise is that the current intellectual property system only recognises the northern industrial model of innovation. The idea is therefore to allow intellectual property laws to:

“... recognise the more informal, communal system of innovation through which Southern farmers and indigenous communities produce, select, improve and breed a diversity of crop and livestock varieties.”¹⁰⁵

This should be done by recognising collective intellectual rights to local communities. This Bill thus seeks to use the same legal constructs used to foster the development of a seed industry in a bid to exclude the current holders of monopoly rights and by giving similar monopoly rights to local communities.

In the proposed Biodiversity Bill, while local communities are granted collective intellectual property rights to their knowledge, they share their property rights with the central government which is co-owner of biological resources together with the “people of India”.¹⁰⁶ This is meant to prevent piracy of genetic material, to strengthen the negotiating capacity of the Country by having state sovereignty backed by people’s sovereignty and to ensure just returns for allowing access to biological resources. Article 18 of the Bill thus seeks to avoid direct negotiations between a major company and a local community by giving a role to the central government in any negotiations pertaining to the exploitation of knowledge of a biological resource.

(b) *The Kerala Tribal Intellectual Property Rights Bill*

The Kerala Tribal Intellectual Property Rights Bill constitutes an attempt to grant rights specifically to indigenous and tribal communities in Kerala.¹⁰⁷ This Bill includes a number of interesting elements. It states, for instance, that the protection of intellectual property under this Bill will be perpetual. This thus constitutes an extension of usual

¹⁰⁴ See Biodiversity (Rights and Protection) Bill, 1998 (proposed by the Research Foundation for Science, Technology and Ecology and Lawyers Collective; on file with the author).

¹⁰⁵ See Shiva, *supra*, footnote 71, p. 29.

¹⁰⁶ See Article 6 of the Biodiversity (Rights and Protection) Bill, 1998, *supra*, footnote 104.

¹⁰⁷ See Kerala Tribal Intellectual Property Rights Bill, 1996 (1998 version on file with the author).

intellectual property law which seeks to balance monopoly rights with the so-called “sunset clause” whereby the rights are of limited duration. Further, Article 9 of the Bill clearly states that the state-level and local bodies set up under the Bill to facilitate its implementation do not gain any ownership rights. This differs from the previous proposal, which grants co-ownership to the central government. The Bill also takes into account the problem of the difficulty of access to national patent offices for local actors. It thus provides that intellectual property rights can be registered with the local *panchayats*.

(c) *Community patents in the context of a sui generis system*

Patents to communities are being proposed as a way to give local communities actual property rights over their knowledge. In this sense, these proposals are extremely progressive. They do not, however, constitute appropriate models for the development of a real alternative to patents. Indeed, the two proposals reviewed seek to extend the application of patents to new actors, but do not go beyond patents. In other words, the two bills seek to broaden the purview of patent law but do not define an alternative.

The fact that these proposals are framed as patents may indeed constitute their biggest shortcoming. Even though community intellectual rights are meant to prevent bio-piracy and to afford recognition of innovation at local levels by strengthening local communities’ rights, the fact that they seek to fight off formal breeders on a par is probably unrealistic. Indeed, it is hardly conceivable that local communities can beat formal breeders on their own turf. They may make some marginal gains in the short-term by obtaining property rights over their current inventions but most probably will not be able to compete in the long term with other actors.

3. *Biodiversity Registers*

The creation of Biodiversity Registers has been proposed and implemented in a number of cases. The rationale for these Registers is, in general, to document existing knowledge to stop patent claims from being accepted in other jurisdictions because of a lack of written description of the knowledge at stake and to levy charges on bio-prospecting 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, such as the turmeric application referred to above.

(a) *The Pattuvam experiment*

In Kerala, one village made headlines when it organised a ceremony to signal the completion of a Register concerning all the resources found in the territory of the

village. The village of Pattuvam in Kannur district is not the only village to have undertaken the process of registering its natural resources and knowledge pertaining to these resources but it has added noteworthy elements. First, while the impulse for the setting-up of the Register seems to have come mainly from a private group, the local *panchayat* actively supported the project.¹⁰⁸

Second, one of the most interesting features of the Pattuvam Register is that it is accompanied by a People's Biodiversity Declaration of Pattuvam, which outlines the aims for the existence of a register in very clear terms.¹⁰⁹ 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, 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 instance, 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.

It is noteworthy that this seems to constitute the only example of a register being accompanied by a declaration of the people concerning the use of the register. Furthermore, the villagers decided to keep the Register secret and to allow information sharing only in exceptional cases. The Register is thus not prepared to foster the commercial exploitation of local resources by others but mainly to stop others from asserting rights over prior local knowledge.

(b) *The Centre for Ecological Sciences*

The Centre for Ecological Sciences (CES) in Bangalore has been very active in discussions concerning plant variety protection and patents. At the practical level, one of the main propositions of the CES is to establish Biodiversity Registers to document the knowledge related to the management of biological resources which reside with India's local communities. The Registers are meant to provide information for the sustainable management of biological resources. They are also to be used as a tool to establish claims of individuals and local communities over knowledge of uses of biodiversity resources and to bring them an equitable share of the benefits flowing from the use of such knowledge and resources. Finally, the Registers constitute a tool to perpetuate and promote the development of the practical ecological knowledge of local communities.¹¹⁰

The CES seeks to produce open Biodiversity Registers with the idea of putting as much information as possible in the public domain to stop others from claiming novelty

¹⁰⁸ Following the completion of the Register, collaboration with the local authorities seems to have ebbed.

¹⁰⁹ The following description of the Declaration is based on an English translation by Mohan Kumar of the original Malayalam text.

¹¹⁰ See, e.g., Madhav Gadgil, *et al.*, *People's Biodiversity Register*, Amruth, 2 October 1996.

on existing knowledge. It basically favours an approach which purports to make information on genetic resources widely and easily accessible and make its use attractive to Indian and foreign enterprises.¹¹¹

(c) *Biodiversity registers in the context of a sui generis system*

Biodiversity Registers constitute an excellent tool to counter unwarranted patent applications. They provide a written support to claims that knowledge is already existing in some parts of the world and therefore cannot be patented as being state-of-the-art. They may be especially useful in the case of patent applications in the United States where novelty is judged only against published materials, when the application relates to foreign knowledge.¹¹² Furthermore, they can serve as an extremely useful source of knowledge for all farmers in case access is offered to other farming communities and may contribute to revitalising the farmer's role as a breeder.

However, in the context of the development of a *sui generis* system, they suffer, like community patents, from serious shortcomings. This is again due to the fact that registers are specifically promoted to counter the threat of patents. 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. Some specific concerns can be highlighted.

First, while registers can be very effective to counter patent claims by others on knowledge held locally, they cannot stop the utilisation of genes from plants produced in a given village by outsiders who will then be able to patent novel products and processes. The recent EU Directive on the legal protection of bio-technological inventions, which provides that biological material which is isolated from its natural environment or produced by means of a technical process may be the subject of an invention even if it previously occurred in nature, is of direct relevance in this context.¹¹³

Second, a register does not help anyone claiming rights on knowledge. Indeed, the contrary is true. The registers are meant to show that this knowledge is public knowledge and is therefore not patentable. Since patents constitute the only intellectual property rights available to protect knowledge or inventions, farmers and local communities are thereby denied any rights to their knowledge. The registers stop other people from asserting rights over this knowledge but they are not being proposed in association with new forms of property rights in favour of the first right holders.¹¹⁴

Third, open registers seem in some way to constitute a subsidy on laboratory research since information will be at the disposal of all, with at most a monetary charge

¹¹¹ See, e.g., Gadgil, *supra*, footnote 96.

¹¹² See Title 35—Patents, 35 U.S.C. 102.

¹¹³ See Article 3 of Directive 98/44/EC of the European Parliament and of the Council on the Legal Protection of Biotechnological Inventions, 6 July 1998, O.J. L 213.

¹¹⁴ As will be seen in the next Section, the response of register proponents is to provide financial compensation to farmers and/or local communities as part of a benefit-sharing arrangement. Benefit-sharing is, however, not akin to a right.

made for access. Current right holders do not have the right to stop an unwanted transaction. Closed registers, as in Puttuvam village, evade this criticism since they show clearly that the intent is to assert the rights of a local community while not denying requests from other similarly placed communities for access to information. Furthermore, access to information contained in the Register is decided at the community level and not by an external body.

Finally, though this may theoretically be remedied, it is hardly conceivable that anyone will be able to survey all patent applications throughout the world to check whether they infringe on a given register. At the same time, even if it were possible to check all patent applications, it is highly unlikely that it will ever be possible to challenge all the applications making unauthorised use of the registers.¹¹⁵

4. *Benefit-Sharing*

The concept of benefit-sharing is directly 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. Building upon these premises, a number of people have argued for a form of monetary compensation which is offered instead of property rights. Benefit-sharing is proposed as an instrument to ward off bio-piracy, which involves absolutely no compensation or recognition of local people's knowledge. However, benefit-sharing constitutes an extremely narrow avenue which assumes that local people do not have intellectual property rights over their knowledge.

At the international level, benefit-sharing has been included in the Convention on Biological Diversity. The Committee established to draft a Biological Diversity Act has taken this up and made it into one of the major pillars of this proposed Act. The rationale for benefit-sharing seems to be linked to the fact that the exploitation of biological resources is becoming increasingly important. Accordingly, it is submitted that there is a necessity to create an economic incentive for their conservation.¹¹⁶ The bluntness of benefit-sharing appears clearly in the proposed Article 18 which states that:

“The National Authority shall in recognition of the contribution made by conservers of biological resources, creators and holders of knowledge and information relating to the use of biological resources allocate to such persons, such sum of money as it may deem fit.”¹¹⁷

There is no hint that the “conservers of biological resources, creators and holders of knowledge and information relating to the use of biological resources” may be the owners of these resources and should thus have the right to determine whether they want to sell and at what price.

Benefit-sharing has also been strongly advocated by the Centre for Ecological

¹¹⁵ See, e.g., Suman Sahai, *Protecting Basmati*, 33/9 Econ. & Pol. Wkly 442 (1998).

¹¹⁶ See M.S. Swaminathan Research Foundation, *A Conceptual Framework for Promoting Benefit Sharing in the Area of Conservation and Use of Plant Genetic Resources*, prepared for the United Nations Environment Programme (UNEP), March 1998.

¹¹⁷ Article 18 of the Outline of the Proposed Biological Diversity Act, *supra*, footnote 93.

Sciences and is seen as a direct corollary of Biodiversity Registers.¹¹⁸ Again, benefit-sharing and Biodiversity Registers falls directly within strategies which accept the current international patents system as a given and do not acknowledge that farmers' innovations are worthy of protection through property rights. Benefit-sharing is meant here as an attempt to make the bargain offered to current right holders slightly less bitter. In practice, two main elements are suggested. First, the CES proposes that the use of all public domain information should be acknowledged in the patent application, including its origin and a proof that the knowledge or material used was obtained through prior informed consent.¹¹⁹ Second, it proposes the establishment of a fund constituted, for instance, of part of the royalties received by a given company having drawn on information contained in the Register. In cases where a single person or community is the holder of the knowledge at stake, the fund could then 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.

(a) *The case of Aarogyappacha*

A number of benefit-sharing experiments have already been carried out, but it is worth mentioning one which has attained prominence and has even been chosen by the Government of India as a case-study on benefit-sharing presented to the Secretariat of the Convention on Biological Diversity.¹²⁰ The Kani people of southern Kerala were persuaded by some biologists they met to share with them some of their knowledge concerning a plant called *Aarogyappacha* or *trichopus zeylanicus travancoricus*.¹²¹ Though widely used by local people, the plant itself seems to have been unknown to outsiders until 1987.

The Tropical Botanical Garden and Research Institute (TBGRI) is one of the largest botanical gardens in Asia. It was set up by the Government of Kerala. It functions largely autonomously, but important decisions need to be approved by the governing body which is chaired by the Chief Minister of Kerala. TBGRI carried out research on the plant and, after identifying its active ingredients, developed a drug with anti-fatigue properties called *Jeevani*. The rights to manufacture *Jeevani* were transferred to a private manufacturer for a licence fee of about US\$ 24,000 for seven years and a 2 percent royalty on sales. TBGRI decided to give 50 percent of the fee and royalty to the Kanis. This has been hailed as a model for future transactions.

The deal was well accepted by the section of the community which had had

¹¹⁸ The following is based in part on information provided by Utkarsh Ghate of the Center for Ecological Sciences.

¹¹⁹ See, e.g., G. Utkarsh, *From Biopiracy to Biopartnership: Dealing With Intellectual Property Rights and Biodiversity* (on file with the author, January 1999).

¹²⁰ See *Benefit Sharing Model Experimented by Tropical Botanic Garden and Research Institute* (TBGRI), available at «<http://www.biodiv.org>» (visited 20 March 1999).

¹²¹ See, generally, R.V. Anuradha, *Sharing With the Kanis—A Case Study from Kerala, India*, January 1998, available at «<http://www.biodiv.org>» (visited 20 March 1999); and Max Martin, *How to Sell a Wonder Herb*, 7/12 Down to Earth 29 (1998).

significant interactions with TBGRI, including the people who shared the knowledge. Other segments of the Kanis are, however, opposed to this arrangement. The Kerala Institute for Research, Training and Development of Scheduled Castes and Scheduled Tribes (KIRTADS), a research institute under the Government of Kerala, has also opposed it vehemently. KIRTADS and the other opponents feel, for instance, that overall the Kanis have not been involved in the negotiating process and that the benefit-sharing arrangement is a unilateral decision of TBGRI. KIRTADS further contends that other practical arrangements should have been found. Instead of a financial transfer, TBGRI could have imparted technical know-how to the Kanis to manufacture the drug and thereby involved them further in the process.

Other issues of concern have also been highlighted. First, one of the most difficult issues relates to the sharing of the proceeds to be forwarded by TBGRI. In late 1997, a trust fund was created to allow the sharing with the Kanis. The trust resources will be used to enhance the welfare of the Kani tribe. Difficulties include, for instance, the necessity to secure the participation of all Kanis, including the ones opposed to the deal and the management of large amounts of cash inputs in a relatively non-monetised economy. Second, the production and collection of the raw material has become a bone of contention because of the legal status of the Kanis' lands. The Kanis live mostly in technically reserved forest areas, and are only granted the right to dispose of minor forest products by the Government. *Aarogyappacha* does not fall into this category and is thus under the control of the Forest Department. Since scientists believe that the active ingredients of *Aarogyappacha* come out best in their natural habitat, the manufacturer has tried to collect leaves from the area through the Kanis. The Forest Department, fearing over-exploitation of the resources, has not given the Kanis permission to harvest the leaves for commercial use.

(b) *Benefit-sharing in the context of a sui generis system*

Benefit-sharing constitutes one of the strategies proposed to reduce the impact of patents on farmers and local communities. Indeed, like Biodiversity Registers, it has the potential to mitigate or reduce some undesirable impacts of patents on biological resources for the holders of the resources and knowledge pertaining thereto. It constitutes a useful strategy to eliminate bio-piracy, which is marked by the absence of any acknowledgement, compensation or benefit-sharing. In this respect, the Kani case shows both the positive side and the limits of benefit-sharing. While local people are slated to benefit financially from the project, the arrangement has created animosity between different parts of the community and the recipients do not seem to have been involved in discussing the terms of the agreement.

More importantly, benefit-sharing seeks to offer financial compensation where there should be rights. In effect, it legalises and legitimises the dispossession of local people's rights over their resources and their knowledge. To avoid bio-piracy, it thus

sacrifices farmers and local communities' rights. Proponents of benefit-sharing justify it by emphasising the rights that are left to current right holders. These are said to include, for instance, the right to use in perpetuity for subsistence purposes all plant and animal material naturally produced on one's lands.¹²² While retaining the right to use resources found on one's land is indeed fundamental, this must be put in perspective. Benefit-sharing does not create this right, which is a direct consequence of land ownership. However, it drastically restricts farmers' and local communities' rights to their resources and in particular denies any right over their knowledge and inventions. Overall, it is thus apparent that benefit-sharing does not provide a model for a *sui generis* system.

IV. WHITHER PLANT VARIETY PROTECTION?

The previous sections have shown that significant activity is taking place in India concerning the protection of plant varieties. However, most of this practical and conceptual work focuses mainly on ways to fight the patents system and not on defining alternatives. While the legal protection of plant varieties within the context of the TRIPS Agreement is now unavoidable, the form of this protection is not fixed. It is therefore of paramount importance to consider which system would be most appropriate in India and the many countries which are in a comparable situation. This Section first highlights some of the problems identified with current and proposed systems of plant variety protection. It then focuses on delimiting some of the principles that should guide the establishment of a *sui generis* regime.

A. SHORTCOMINGS OF EXISTING AND PROPOSED PLANT VARIETY PROTECTION REGIMES

The previous Sections have identified a number of issues of concern relating to the introduction of patents or PBRs on plant varieties and most of the systems currently proposed in India. This Section brings these various elements together.

1. *Conceptual Weaknesses of Patents and PBRs in Agriculture*

As noted earlier, PBRs have become substantially akin to weakened patents in the 1991 version of the UPOV Convention. Although this Section focuses on patents, most of the conclusions also apply to PBRs.

The patents system seems first to be inherently incapable of protecting local people's intellectual property.¹²³ This is due to the fact that, while local people can restrict access to knowledge they hold, for instance, by keeping closed registers, nobody

¹²² See, e.g., Report of the Expert Committee on Biodiversity Legislation Constituted by the Ministry of Environment & Forests, 1997 (on file with the author).

¹²³ Cf. Gopalakrishnan, *supra*, footnote 50.

has the capacity to stop outsiders from extracting genes from a particular plant and using a given property of the plant.

At the level of benefit-sharing, insurmountable problems arise concerning the source of the materials used. The problem occurs because most communities, countries and regions around the world depend to a large extent on germ plasm from other areas for some of their main food staples. Since it is not possible to trace back all the germ plasm to its very first location, given that in many cases centuries have passed since the first transfers took place, it is questionable whether one community has more rights than another on any plant that is part of their everyday diet for instance. In any case, the source of germ plasm should not be traced to countries but to the actors who actually tend to these resources.¹²⁴

The exclusion of patents in agriculture has traditionally been premised, *inter alia*, 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 patents so as to avoid the over-commercialisation of these sectors. Patents in agriculture lead to the rejection of these various arguments even though most people would probably agree that they remain valid today, especially in countries whose economies are based on agriculture.

In themselves, patents on plant varieties are like any other patent. However, the agricultural sector differs from other sectors of the economy. Not only does it provide for one of our most basic daily needs, but millions of people in India still rely mainly on food grown by themselves and not on the local market. In this situation, it is impossible to presume that all actors who engage in agriculture are only involved because they seek to make a business out of it. In most rural communities, agricultural work and social life are closely linked. The assumption that each and every farmer only seeks to improve his varieties for a monetary gain is thus flawed, as illustrated, for instance, by the case of the Save the Seeds Movement.

Patents are also incapable of apportioning benefits in a manner which fits the realities of the agricultural sector. The granting of a patent implies by definition that the patentee derives all the benefits associated with the invention. Several problems arise from this first-claim-win-all system. First, 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. Second, the fact that the first claimant gets all the benefits implies a race to the finish between different innovators. If assigning patents to local communities may help them get a few patents on inventions just recorded, they will never be able to compete in the longer term with large research institutions or commercial firms. In other words, if farmers must compete with large companies to secure patents, they are bound to lose out.

¹²⁴ Cf. Karnataka Planning Board, *supra*, footnote 97.

The patents system has an extremely undesirable side-effect in the context of the protection of plant varieties insofar as it implies that all knowledge which is not patented is in the public domain and thus freely available. Any knowledge which cannot be protected by patents because it is not state-of-the-art is thus deprived of any legal protection. This is very unfortunate because it gives the impression that the work of the managers of biodiversity is deprived of value while the work carried out in laboratories is the only one which 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.¹²⁵

The identity of the patentee constitutes another problem in the case of agriculture. Some commentators have suggested that patents could be granted to groups such as local communities while it has even been proposed in Kerala that patents could be attributed to a governmental body which would administer patents on behalf of tribal communities. In itself, the extension of patents to communities organised as legal entities should not pose significant problems. However, problems arise because of the nature of the work which is rewarded here. In rural communities, it is often extremely difficult to allot the contributions of different individuals in a given invention. Even when one individual may have clearly made a much more significant contribution than other members, the overall result may still be the fruit of collaborative work among various people. All individuals may agree in some cases to the assignment of rights to a community but a great number of cases cannot be solved in this manner. Indeed, in many cases, assigning the rights to a given *panchayat* for instance, and giving it all the rights concerning an invention may imply a denial of the contribution of other communities or the fact that different communities elsewhere evolved similar techniques or inventions. Overall, the problem relates in large part to the conception of patents as monopoly rights.

Finally, it is necessary to recall that intellectual property in general is not known to foster conservation of biological diversity or promote its sustainable use.¹²⁶ The introduction of patents in agriculture has, like the Green Revolution, the potential to foster the development of higher yielding varieties, but these will also be associated with significant environmental costs.

This series of concerns implies the need for alternative strategy. In terms of TRIPS law, the main strategy to adopt is to define a *sui generis* system, as allowed under Article 27.

2. *Conceptual Weaknesses of Other Proposals*

The analysis of the various proposals to fight patents was shown in previous sections

¹²⁵ Cf. David Wood, *Comment*, in Swaminathan, *supra*, footnote 2.

¹²⁶ See, e.g., Leskien and Flitner, *supra*, footnote 37, at p. 68: stating that "IPR are certainly not an effective instrument to conserve biological diversity or promote its sustainable use".

of this article to be deficient in a number of ways.¹²⁷ First, the use of the generic and specific exceptions provided by the TRIPS Agreement, not including the *sui generis* option, gives Member States only very limited choices to adapt patents to domestic conditions.

Second, proposals to introduce community patents as an alternative to normal patents constitute a way to make the patents system more responsive to the existence of different classes of inventors but do not contribute to the definition of a *sui generis* regime. Even though community patents seek to strengthen local communities' rights, they may be self-defeating because of the way in which the patents system rewards invention. Indeed, it is only state-of-the-art which can be patented and only by a single inventor who derives all the benefits of the invention. This is by definition not favourable to local communities and subsistence farmers.

Third, the creation of Biodiversity Registers, while constituting a useful tool to ward off unwarranted patent applications, does not contribute to the development of a *sui generis* system. This is due to the fact that they are mostly useful as a defensive strategy within the patents system. Further, although they may stop patents on a local plant variety, they cannot stop the appropriation of the genetic information relating to a given variety and the subsequent patenting of this knowledge. Biodiversity Registers also fail to provide an avenue for the establishment of local people's rights over their varieties.

Fourth, benefit-sharing has also the potential to mitigate some of the negative impacts of patents on farmers and local communities. However, it focuses on monetary compensation and not on the definition of property rights for all breeders and in this sense fails to constitute a model for the development of a *sui generis* system.

In sum, none of the current proposals constitute a model for the development of a *sui generis* system in the context of Article 27.3b of the TRIPS Agreement.

B. TOWARDS A *SUI GENERIS* SYSTEM

1. *An Alternative Property Rights System*

Previous sections of this article have shown that the introduction of patents or PBRs in countries like India is likely to have negative impacts for small subsistence farmers and sustainable agriculture generally. The alternative offered by the TRIPS Agreement in the form of a *sui generis* system of protection for plant varieties is thus of prime importance and should be used to its full extent.

Article 27.3.b authorises Member States to choose between patents and an alternative system. Up until now, this liberty has not been fully used by Member States. Furthermore, in the case of India, non-governmental actors have also refrained from taking up the challenge of devising an alternative regime. In both cases, this is partly due to lack of time since the signing of the TRIPS Agreement, the intricacies of the

¹²⁷ See above, Section III.B.

Agreement in general and the pressure to recognise UPOV as the only alternative to patents.

The fact that hardly any country has developed an alternative to patents and PBRs does not mean that the provision is unnecessary. Rather, the introduction of plant variety protection in countries which did not provide any protection is extremely demanding in itself and has the potential to be of major political significance, whether in the forms of patents, PBRs or a *sui generis* regime. Indeed, in India, no government has yet attempted to introduce the Plant Variety Protection Bill to Parliament even though implementation is due by 1 January 2000.

2. *Basic Elements of a Sui Generis System*

(a) *Aims of the regime*

The broadest goal of a *sui generis* regime should be to promote the sustainable management of biological resources. To achieve this, a number of elements are required. First, the regime should aim at protecting not only the interests of corporate bio-technology firms and seed companies, as is the case with PBRs, but also the interests of farmers, who are among the major seed producers in India.¹²⁸ In a way, the regime may be construed as implying the twin recognition of commercial breeders' rights and farmers' rights,¹²⁹ something which was proposed at the international level a decade ago but whose concretisation is still being discussed.¹³⁰ Concerning farmers, the aim should be, *inter alia*, to protect farmers' current techniques or varieties and also allow them to derive benefits from any improvements they will carry out without being stopped by patents. The protection of current knowledge and incremental innovation which does not qualify as state-of-the-art is in direct opposition to the patents system and must thus be considered in an alternative form.¹³¹

(b) *A form of property rights*

The TRIPS Agreement sets out clearly that Member States must protect plant varieties either through patents or an alternative system. The first characteristic of an alternative regime should thus be to place itself outside the patents regime. Indeed, the alternative offered in the Agreement can only be meaningful if it is substantively different from patents.

¹²⁸ Cf. Suman Sahai, *Farmers' Rights*, 418 Seminar 43 (1994).

¹²⁹ Note that the proposed Convention on Farmers and Breeders, December 1998 (on file with the author) promoted as an alternative to UPOV for developing countries does recognise the necessity to include both farmers' and breeders' rights in an alternative regime. See also, Suman Sahai, *Protection of New Plant Varieties—A Developing Country Alternative*, 34/10–11 Econ. & Pol. Wkly 579 (1999).

¹³⁰ See, e.g., Report of the Fifth Extraordinary Session of the Commission on Genetic Resources for Food and Agriculture, Rome, 8–12 June 1998, Doc. CGRFA-Ex5/98/REPORT.

¹³¹ Cf. Thomas Cottier, *The Protection of Genetic Resources and Traditional Knowledge: Towards More Specific Rights and Obligations in World Trade Law*, 1 J. Int'l Econ. L. 555 (1998).

TRIPS requirements imply that plant varieties must be covered by a system of property rights which apportion in a clear and predictable way the rights and duties of the different interested actors. It is significant that a *sui generis* system will by definition establish intellectual property rights. This does not imply any relationship to patents or other TRIPS rights but only reflects the fact that the protection envisaged concerns knowledge.

The obligation to impose property rights on plant varieties may seem insignificant but must be understood in a longer-term context. Traditionally, plant varieties and germ plasm have been held to be part of the common heritage of humankind and thus freely available to all. This was, for instance, reflected in the fact that the seed banks of the International Agricultural Research Centres were opened to anyone, and it is out of these resources that the rice varieties of the Green Revolution were engineered. The TRIPS Agreement is now forcing countries to introduce property rights in this field. Similarly, at the international level, negotiations for the revision of the International Undertaking on Plant Genetic Resources are likely to lead to the formulation of property rights and the complete abandonment of the principle of common heritage which constituted the backbone of the original resolution. The necessity to introduce property rights thus constitutes a significant step in the development of policies which restrict the flow of information.

The diminution of free flows of knowledge may justifiably be seen as negative, but in a world where substantial bio-piracy has and is taking place, it is quite possible that defining property rights may constitute the best route towards eliminating such practices, provided that appropriate legal strategies are used. Another reason for the need to define property rights is apparent at the local level. The breakdown in recent decades of existing social and legal institutions, such as common property systems, has often left a vacuum which can easily be exploited by outsiders, while in other cases existing systems may not be designed to confront outsiders or their legal systems.

(c) *A non-monopoly right*

Another characteristic of *sui generis* rights should be that they be framed as non-monopoly rights. This implies that while commercial breeders can have rights to market their varieties, farmer breeders can at the same time have the right to use their own varieties, exchange them and sell them at least in their localities. In this framework, different systems co-habit more or less co-operatively.

The non-monopoly option constitutes one of the avenues to avoid endless struggles between different actors claiming similar rights. Thus, in the case of neem or turmeric, whose various uses are so widespread throughout the country that no single community could claim them as their own, patents cannot help. The only form of monopoly right which would be relevant here is permanent sovereignty over natural

resources. However, while this may strengthen India's position in the international arena, it does nothing for everyday users and actual innovators.

(d) *The commercialisation aspect*

Another fundamental characteristic of the *sui generis* system is that it should not imply that all actors want to commercialise their knowledge. Indeed, one of the major shortcomings of the patent system is the assumption that the only incentive for innovation is the possibility to commercialise the invention and receive monetary returns. Taking the example of local farmers, while some may try to take advantage of the possibility to commercialise their knowledge, others may not be interested in this possibility.

The *sui generis* regime could provide a system for people who wish to commercialise their knowledge. It could guarantee a niche to small-scale industry while allowing the concurrent development of a large-scale industry. This may constitute a way to allow the two to co-habit in the economy and implies no more than to request large-scale industries to refrain from interfering in village-based industries.

Overall, the *sui generis* system should not seek to prohibit trade or commercialisation but mainly allow a variety of actors to participate in it.

(e) *An effective regime*

The fact that Article 27.3 requires the *sui generis* system to be "effective" has attracted significant attention. As noted, some commentators have argued that, in the TRIPS context, the term effective is used in the context of the enforcement of intellectual property rights.¹³² It has also been submitted that the only existing effective *sui generis* system is the UPOV system. This view cannot be accepted because even UPOV 1978, which still contains a number of exceptions to the rights of commercial breeders, is premised on a conceptual framework which is fundamentally similar to patents. In other words, UPOV is not an alternative regime.

Further, the effectiveness of the *sui generis* system cannot be looked at in isolation. Indeed, the Convention on Biodiversity is, for instance, directly relevant and cannot be ignored in the development of a property rights system for plant varieties. The Convention certainly constitutes in some areas a *lex specialis* which should prevail over the TRIPS Agreement in case of conflict. Furthermore, since most TRIPS Members have also ratified the Convention, there is a need to harmonise the two regimes. It is clear that the two regimes are based on different conceptual premises and were negotiated independently. However, the Convention does acknowledge the potential impacts of intellectual property rights on biodiversity management. It even gives specific guidance to Member States in this regard by stating that they should ensure that such intellectual

¹³² See above, Section 1.D.1.

property rights are supportive of and do not run counter to the objectives of the Convention.¹³³ The Convention should therefore be taken into account when delineating an alternative to patents. Of particular relevance in this context is Article 1, stating that the aims of the Convention are the conservation and sustainable use of biological diversity.

To sum up, an effective system is one which defines property rights which take into account the needs of all actors involved in the management of plant varieties and one which seeks to harmonise the various relevant international instruments.

CONCLUSION

This article has focused on the implications of the ratification of the TRIPS Agreement for India in the specific case of plant varieties. While the focus has been on India, the findings are relevant to a large number of developing countries, in particular all the countries where a majority of the population works in the agricultural sector.

The case has been made for the development of a *sui generis* regime in India, and in other similarly placed developing countries. While a regime based on completely free flows of knowledge would probably be most desirable in theory, the introduction of property rights on plant varieties is now a legal requirement. The adoption of a *sui generis* system which effectively seeks to reward the contribution of all actors involved in the management of plant varieties and which seeks to foster their sustainable management is of great importance at this juncture. It probably constitutes one of the only avenues open to WTO Member States to foster the twin recognition of breeders' and farmers' rights while taking measures against bio-piracy.

Article 27.3.b of the TRIPS Agreement, which authorises countries to choose between patents and a *sui generis* system, is to be reviewed in late 1999. This revision should be postponed for several reasons. First, and most importantly, this study has shown that this provision should be retained. Second, up until now hardly any country has had a chance to put in place a *sui generis* legislation, and it is noteworthy that developing countries are not supposed to introduce any form of protection before 1 January 2000. Third, since developed countries' laws or the UPOV Convention do not constitute directly applicable models for most developing countries, significant original work will have to be carried out before *sui generis* legislations responsive to the local concerns and needs of each country can be drafted and implemented.

¹³³ Article 16.5 of the Biodiversity Convention, *supra*, footnote 51.