Plant Variety Protection, International Agricultural Research, and Exchange of Germplasm: Legal Aspects of Sui Generis and Patent Regimes

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ABSTRACT

This chapter outlines the range of plant variety protection regimes that currently exist internationally, including the International Convention for the Protection of New Varieties of Plants, the Convention on Biological Diversity, the Agreement on Trade-Related Aspects of Intellectual Property Rights, and the International Treaty on Plant Genetic Resources for Food and Agriculture. The chapter commences with a history of intellectual property laws affecting plant breeding and the genetic modification of plants. It explores the trend toward the harmonization of international standards and concludes with an examination of the impact of these developments upon germplasm exchange, international agricultural research, and food security.

1. INTELLECTUAL PROPERTY RIGHTS AND AGRICULTURE

The first international intellectual property (IP) convention was the 1883 Paris Convention for the Protection of Industrial Property. In this instrument, agriculture was envisaged as an area of enterprise in which property rights could be secured, thus Article 1(3) of the Paris Convention declared that:

> *Industrial property shall be understood in the broadest sense and shall apply not only to industry and commerce proper, but likewise to agricultural and extractive industries and to all manufactured or natural products, for example, wines, grain, tobacco leaf, fruit, cattle, minerals, mineral waters, beer, flowers, and flour.*

Given the state of technology in 1883, the inclusion of these agricultural subjects within the Paris Convention was for the purpose of protecting trademarks and indications of source.

The first inclusion of biological agricultural innovations in an IP statute was in the U.S. Plant Patents Act of 1930, which created a sui generis system confining protection to asexually reproduced plants, so confined because of the view that sexually reproduced varieties lacked *stability*.[1] The Act also excluded tuber-propagated plants principally because of a concern that protecting such plants would lead to monopolies in basic foodstuffs such as potatoes.[2] Applicants for plant patents were required to asexually reproduce the plant for which protection was sought, to demonstrate the stability of the characteristics of the plant being claimed. Section 161 required that new varieties be "*distinct.*" The statute did not define this requirement, although the Senate Committee report accompanying the act stated that "*in order for a new variety to be distinct it must have characteristics clearly distinguishable from those of existing varieties*" and that it was not necessary for the new variety to constitute "*a new species.*"[3]

Legislation similar to the Plant Patents Act was adopted in Cuba in 1937, in South Africa in 1952, and in the Republic of Korea in 1973.

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2. INTERNATIONAL STANDARDS FOR SUI GENERIS PVP

As with other categories of IP, a key role in the inclusion of agricultural innovations within the international regulatory regime was played by industry associations. The Congrès Pomologique de France, held in 1911, had called for special protection for plant varieties. This agitation continued in the 1920s and 1930s, culminating in the founding, in Amsterdam in November 1938, of the International Association of Plant Breeders for the Protection of Plant Varieties (ASSINSEL). At its Semmering Congress in June 1956 a resolution of ASSINSEL called for an international conference to promulgate an international system for the protection of new plant varieties. In February 1957, the French government issued invitations to 12 western European countries[4] to attend a diplomatic conference in Paris in May of that year to consider establishing such a system. Participation was limited by the French to those states who were known to have similar concerns to it on this subject. The conclusions of the 1957 Paris conference were set down in its Final Act, adopted in May 1957. This recognized the legitimacy of breeders' rights and established as the preconditions for protection that a variety had to be distinct from pre-existing varieties and sufficiently *homogenous* and *stable* in its essential characteristics. The act defined the rights of the breeder and acknowledged the principle of the independence of protection. At the second session of the conference, held in Paris in late 1961, the International Convention for the Protection of New Varieties of Plants, or Union pour la Protection des Obtentions Végétales (UPOV), was adopted. Article 4(1) applied the Convention to "*all botanical genera and species,*" but it was envisaged that the Convention would have a gradual introduction. A list of 13 genera was annexed to the Convention: wheat, barley, oats or rice, maize, potato, peas, beans, Lucerne, red clover, ryegrass, lettuce, apples, and roses or carnations. Article 4(3) required each member state, upon entry into force of the Convention, to apply it to at least five genera from this list and, within eight years, to all the listed genera.

Article 27 of the 1961 Convention provided for its periodic review, with the first revision scheduled for 1972. Within the first 19 years of its life, the UPOV Convention had attracted the accession of only 12 states. A reason identified for the reluctance of states to adopt the Convention was the stringency of its provisions, in particular the obligation of states to select either patent or UPOV-style protection for plant varieties, but not both. Article 2 of the Convention was amended to permit the accession of countries, like the United States, which had laws allowing for the double protection of varieties under both patent and UPOV-style sui generis laws. The list of genera, annexed to the 1961 Convention was removed. This list had contained mainly species from temperate climates. Under the new Article 4, member states agreed to apply the Convention to at least five genera, rising to 24 genera within eight years. Additionally, a grace period was introduced to permit the marketing of varieties for up to 12 months prior to submitting an application for plant variety protection (PVP).

A further broadening of the UPOV Convention occurred with the 1991 revision. The 1991 Act requires states to protect at least 15 plant genera, upon becoming members, and to extend protection to all plants within 10 years (Article 3(2)). In response to demands from breeders in developed countries, the 1991 Act removed the prohibition against dual protection. The 1991 Act recognized *breeders' rights* to use protected varieties to create new varieties. However, this exception is itself restricted to such new varieties as were not "*essentially derived*" from protected varieties (Articles 14(5) and 15). The drafters added this restriction to prevent second generation breeders from making merely cosmetic changes to existing varieties in order to claim protection for a new variety. The concept of essential derivation has, however, proved highly controversial in practice. Breeders have been unable to agree on a definition of the minimum genetic distance required for second generation varieties to be treated as not essentially derived from an earlier variety and thus outside of the first breeder's control.[5]

From the perspective of farmers, probably the most contentious aspect of the 1991 Act was the limitation of *farmers' rights* to save seed for propagating "*on their own holdings*" the product

of the harvest that they obtained by planting a protected variety on their own holdings, "*within reasonable limits and subject to the safeguarding of the legitimate interests of the breeder*" (Article 15(2)). Unlike the 1978 Act, the 1991 version of the farmers' privilege does not authorize farmers to sell or exchange seeds with other farmers for propagating purposes. This is criticized as inconsistent with the practices of farmers in many developing nations, where seeds are exchanged for purposes of crop and variety rotation.[6]

A number of developing countries have resisted the adoption of the 1991 Act as the standard for PVP laws. The foreign ministers of the *Organization for African Unity* issued a statement at a January 1999 meeting calling for a moratorium on IP protection for plant varieties until an Africa-wide system had been developed that granted greater recognition to the cultivation practices of indigenous communities.

3. THE UPOV SYSTEM

In most countries the implementation of the UPOV Convention requires domestic legislation.

3.1 *Scope of plant breeders' rights*

Generally, the *plant breeders' rights (PBRs)* conferred by domestic legislation modeled on UPOV are defined as the exclusive right to do or to license the following acts in relation to propagating material of the plant variety:

- produce or reproduce the material
- condition the material for the purpose of propagation
- offer the material for sale
- sell the material
- import the material
- export the material
- stock the material for all of the purposes described above

3.2 *Exceptions*

Excepted from these rights, under the UPOV Convention, are acts performed privately and for noncommercial purposes, for experimental purposes, or for the purpose of breeding other plant varieties. As was mentioned above, seed saved by a farmer from harvested material and treated for the purpose of sowing a crop on that farmer's own land is considered not to be an infringement by legislation based on UPOV 1991.

Legislation may also provide that PBRs are not infringed when propagating material is used as a food, food ingredient, or fuel, or for any other purpose not leading to or involving the production or reproduction of propagating material.

Also, it may be provided that PBRs are exhausted following the sale of propagating material by a grantee unless there is a multiplication of the material after the sale.

3.3 *Duration of plant breeders' rights*

The general duration of PBRs, provided by legislation implementing UPOV 1991, is to be 25 years in the case of trees and vines and 20 years for any other plant type. This duration period commences on the date of grant of PBRs in the variety. Where a plant variety is declared to be essentially derived from an initial variety, the total duration of protection for the dependent or essentially derived variety generally can last for no longer than the duration of the protection of the initial variety.

3.4 *Application for plant breeders' right*

Eligible applicants are usually plant breeders who are citizens or residents of the country in which they are applying for the permit, if the variety is bred in the country. On the other hand, a country might permit anyone, domestic or foreign, to apply for a variety under the country's laws.

Ineligible applications will generally involve varieties previously sold in the country.

3.5 *Form of application*

The form of application for PBRs will be prescribed by the national legislation. It will provide that an application must contain:

1. the name and address of the applicant
2. the name and address of the agent, if any, making the application on the applicant's behalf
3. a statement to that effect if the applicant is the breeder of the variety

4. if the applicant is not the breeder of the variety, details of the applicant's right to make the application
5. a brief description, with a photograph, if appropriate, of a plant of the variety sufficient to establish a *prima facie* case that the variety is distinct from other varieties of common knowledge
6. the name, and any proposed synonym, for the variety
7. particulars of the location at which and the manner in which the variety was bred, including particulars of the names by which the variety is known and sold in the country and particulars of any PBRs granted in the country or in another country that is a signatory to the UPOV Convention
8. particulars of any application for, or grants of, rights of any kind in the variety in any other country
9. the name of an approved person who will verify the particulars of the application and who will supervise any test growing of the variety required under Section 37 of the Act and who will verify a detailed description of the variety; and
10. such other particulars, if any, as are required by the approved form.

3.6 *Application fee*

An application fee will usually be prescribed under the legislation.

3.7 *Acceptance or rejection*

The authority or official that is responsible for the administration of the relevant law will be required to decide, as soon as is practicable after an application is filed, whether to accept or reject the application. Where the authority or official is satisfied that the application is prior in time to any other application and that it complies with the requirements of the legislation and establishes a prima facie case for treating the plant variety as distinct from other varieties, the application must be accepted. Upon acceptance, the applicant must be notified that the application has been accepted and public notice of the acceptance must also be given. Similar notification obligations apply when an application is rejected.

3.8 *Variation of application*

After an application for PBRs has been accepted, but before concluding the examination of that application, the authority or official may permit an applicant to vary an application, subject to the payment of a prescribed fee.

An application is usually permitted to be withdrawn by an applicant at any time. If this occurs after public notice of the application, the authority or official must, as soon as is practical, give public notice of the withdrawal.

3.9 *Detailed description of the plant variety*

Whenever it is practical, but not later than 12 months after an application has been accepted, or within such further period granted by the authority or official, the applicant is usually required to give a detailed description of the plant variety to which the application relates. Failure to supply this description will result in the application being deemed to have been withdrawn. The detailed description must be in writing and in an approved form, containing particulars of:

1. the characteristics that distinguish the plant variety from other varieties, the existence of which is deemed a matter of common knowledge
2. any test growing carried out
3. any test growing outside the country that tends to establish that the variety will, if grown in the country, be distinct, uniform and stable; and
4. other such particulars that may be prescribed.

3.10 *Objection to an application for PBRs*

The administering authority is usually obliged to give public notice of the detailed description as soon as is practicable after it has been received. A person may object to an application for PBRs if they can establish that their commercial interests would be affected by the grant of PBRs to the applicant and that the authority cannot be satisfied that the various substantive requirements of the law have been met by an applicant.

The objection must set out the particulars of the manner in which the person believes his or her commercial interests would be affected and the reasons why the person considers that the authority cannot be satisfied that the various substantive requirements of the law have been met.

3.11 *Inspection of application and objections*

A person may, at any reasonable time, inspect an application for PBRs over a plant variety, or an objection lodged in respect to that application. Upon payment of a prescribed fee, a copy of an application or an objection to an application is to be provided.

3.12 *Test growing of plant varieties*

In the case of an application that has been accepted, or an objection to such application, or a request for revocation of PBRs, the authority may require a test growing, or a further test growing, of the variety. In such case, notice may be required to be provided to all relevant persons. The notice, in addition to telling the applicant, objector, or grantee of the authority's decision, must specify the purpose of the test growing and may require the person to supply the authority with sufficient plants or propagating material and with any necessary information to permit the authority to arrange a test growing, or to make arrangements for an approved person to supervise the test growing and to be supplied with plants or propagating materials. The expense of a test growing must be borne by the applicant, objector, or person requesting revocation of the PBR. Provision may be made for a test growing outside the country of a plant variety that was bred outside the country.

3.13 *Provisional protection*

Where an application for PBRs is accepted, the applicant is taken to be the grantee of that right from the date that the application is received until the application is disposed of. During this period of provisional protection, the applicant is prevented from commencing any infringement action with respect to the PBRs, until such time as the application is finally resolved in the applicant's favor.

3.14 *Declarations of essential derivation*

Where a person is the grantee of PBRs over a particular plant variety (the initial variety) and another person is the grantee of, or has applied for, PBRs in another variety (the second variety) the grantee of PBRs in the initial variety may seek a declaration that the second variety is an essentially derived variety of the initial variety. A plant variety is defined to be an essentially derived variety of another plant variety if:

1. it is predominantly derived from the other plant variety
2. it retains the essential characteristics that result from the genotype or combination of genotypes of that other variety; and
3. it does not exhibit any important (as distinct from cosmetic) features that differentiate it from that other variety.

The application for essential derivation must be in an approved form and contain such information relevant to establishing a prima facie case of essential derivation. If the authority is satisfied, or not satisfied, as the case may be, that a prima facie case has or has not been established, the applicant and the grantee of PBRs in the second variety must be informed and provided an opportunity to rebut the prima facie case. The authority may order a test growing in order to rebut a prima facie case of essential derivation.

3.15 *Grant of PBRs*

Where an application for PBRs in a plant variety is accepted, the law will provide that following examination of the application. The authority must grant the right to the applicant where it is satisfied that:

1. there is such a variety
2. the variety is registrable within the law
3. the applicant is entitled to make the application
4. the grant of that right is not prohibited by the law
5. the right has not been granted to another person
6. the name of the variety complies with Section 27

7. propagating material of the variety has been deposited for storage, at the expense of the applicant, in a genetic resource center approved by the authority
8. a satisfactory specimen plant must be supplied to a prescribed herbarium; and
9. all fees have been paid.

PBRs are granted by the issue of a certificate in approved form.

3.16 *Effect of a grant of PBRs*

If a person is granted PBRs over a plant variety, the grantee will take precedence over any other person who was entitled to make an application for the right in the variety. Such person is not prevented, however, from applying for a revocation of rights or to seek administrative review of the authority's actions in relation to the grant of PBR or to request the authority to make a declaration that the variety over which rights were granted was essentially derived from another plant variety. Where it has been determined that another person was entitled in law or equity to an assignment of the right to make an application for the PBRs, that person may be entitled to an assignment of the PBRs.

Where the relevant Minister for Agriculture considers it appropriate, PBRs may be granted subject to conditions. The Minister would probably take the advice of any Plant Breeders' Rights Advisory Committee established under the law.

3.17 *Revocation*

There may be provision for the revocation of PBRs, or a declaration that a plant variety is essentially derived from another plant variety, if the authority becomes satisfied that facts had existed that, if known before the grant of the right or the making of the declaration, would have resulted in the refusal to grant the right or make the declaration. Revocation may also result from a failure to pay prescribed fees. Within a prescribed number of days of the decision to revoke, the grantee or transferee of PBRs may be provided with particulars of the grounds of proposed revocation.

Applications for revocation may be made by a person whose interests are affected by the grant of PBRs over a plant variety or by a declaration of essential derivation. In the event of revocation or surrender of PBRs, particulars of revocation or surrender will usually be entered in the PBRs Register and published.

3.18 *Compulsory licensing*

National laws usually require the grantee of PBRs in a plant variety to take all reasonable steps to ensure reasonable public access to that plant variety. This requirement is considered to be satisfied if propagating material of reasonable quality is available to the public at reasonable prices, or as gifts to the public, in sufficient quantities to meet demand. For the purpose of ensuring reasonable public access, the law may permit the relevant authority to license an appropriate person to sell propagating material of plants of that variety, or to produce propagating material of plants of that variety for sale, during such period as the authority considers appropriate and on such terms and conditions (including the provision of reasonable remuneration to the grantee) as the authority considers would be granted by the grantee in the normal course of business.

A person may make a written request to the authority for the grant of a license where a person considers that a grantee is failing to ensure reasonable public access to a plant variety and that failure affects that person's interests. The request must set out particulars of the alleged failure and of the effect upon the person's interests. The authority is then usually required to provide the grantee an opportunity within a prescribed period to satisfy the authority that the grantee is providing reasonable public access to a plant variety, or that he or she will comply within a reasonable period of time. Where the authority decides to grant a license, a public notice will be issued identifying the variety, detailing the particulars of the license that is proposed to be granted and an invitation to persons to apply for a license. The authority is usually required to consider all applications and publicly notify the proposed licensee, as well as notifying each of the applicants.

3.19 *Infringement of PBRs*

Generally speaking, PBRs in a plant variety are infringed by an unauthorized person:

1. performing acts that are included in the PBRs
2. claiming the right to perform one of those acts; and
3. using the name of a registered variety in relation to another plant or another plant variety.

An infringement will not occur where the act complained of is exempted from the operation of the law. A defendant in an action for infringement of rights may counterclaim for revocation of the rights on the grounds that the variety was not a new plant variety or that facts existed that would have resulted in the refusal of the grant of those rights.

3.20 *Remedies*

In an infringement action, a nominated court may grant an injunction subject to any terms that the court thinks fit and, at the option of the plaintiff, either damages or an account of profits. Where a person satisfies the court that at the time of the infringement he or she was not aware of that right, and had no reasonable grounds for suspecting the existence of the right, it may refuse to award damages or order an account of profits.

3.21 *Administration*

Most laws provide for the establishment of the Office of the Registrar of Plant Breeders' Rights, which is responsible for the general administration of the Act and for the maintenance of the Register of Plant Varieties.

The office of the Registrar will usually issue an official Plant Varieties Journal in which all public notices are to be published.

3.22 *Genetic resource centers and herbaria*

The law may provide for the nomination of genetic resource centers for the storage and maintenance of germplasm material.

4. PATENTS ON PLANTS, VARIETIES, SEEDS, AND OTHER PROPAGATING MATERIAL

As mentioned above, PVP laws were developed in response to industry calls for sui generis protection of agricultural and horticultural innovations. However, a seed-saving exception for farmers was included as a public policy safeguard, an early reflection of food security concerns. Such a safeguard does not generally exist in patent statutes, and this absence was an inducement for seed companies to shift their attention to the patent system as a means of protecting their innovations. This shift in attention also coincided with the development of modern biotechnologies.

Patent protection was not originally considered to be a particularly effective system for the protection of plant varieties. Prior to the development of modern biotechnology, the breeding of a new variety could not be said to involve an inventive step, and such innovations as were made could be considered to be obvious rather than inventive. However, with the extension of patent protection to recombinant DNA methods for producing transgenic plants and their resulting products, patents have been assuming increasing significance in PVP. The broader ambit of patent rights is one particular advantage of this form of IP protection, covering, as it does, plants, seeds, and enabling technologies. Plant variety rights are highly specific to the variety, and their scope is limited by reference to the physical (propagating) material itself, combined with the description of the variety given in the documentary grant of the rights.

4.1 *European prohibitions on patentability*

Article 53(b) of the European Patent Convention (EPC) excludes plant varieties, as well as "essentially biological processes" from the scope of patentable subject matter. This raises, in the first instance, the definitional distinction between *plants* and *plant varieties*. The UPOV Convention defines plant variety in terms of a plant grouping within a single biological taxon of the lowest known rank. The grouping can be:

- defined by the expression of characteristics (such as shape, height, color, and habit) resulting from a given genotype or combination of genotypes
- distinguished from any other plant grouping by the expression of at least one of these characteristics

- considered as a unit with regard to its suitability for being propagated unchanged

The first consideration of the distinction between plant and plant variety by the Technical Board of Appeal of the European Patent Office (EPO) occurred in 1984 in the *Ciba-Geigy* determination.[7] This case concerned a plant that had been treated with a chemical compound to confer on the plant a degree of protection from the toxic side effects of certain herbicides. The Examination Division had refused the patent application on the basis of Article 53(c). This was reversed by the Technical Board of Appeal, which, applying the definition of plant variety in the UPOV Convention, stated that "*Article 53(c) prohibits only the patenting of plants or their propagating material in the genetically fixed form of the plant variety… Plant varieties in this sense are all cultivated varieties, clones, lines, strains and hybrids.*"[8] In this case the claims covered merely the application of a chemical treatment and not plant varieties as such.

This approach was applied by the Technical Board of Appeal in the case *Lubrizol (Hybrid Plants)*[9] where the Board held that "*the term* plant varieties *means a multiplicity of plants which are largely the same in their characteristics (that is, homogeneity) and remain the same within specific tolerances after every propagation or every propagation cycle (that is, 'stability').*"[10] The Board then ruled that as the hybrids in issue were not stable, they did not fall within the excluded category of plant varieties.

The European Directive on the Legal Protection of Biotechnological Inventions (the Directive) permits the patentability of inventions concerning plants, where "*the technical feasibility is not confined to a particular plant … variety.*"[11] Patent claims can therefore be made with respect to plant groupings, or as stated in Recital 31 to the Directive,

Whereas a plant grouping which is characterized by a particular gene (and not its whole genome) is not covered by the protection of new varieties and is not excluded from patentability even if it comprises new varieties of plants.

This qualification was addressed by the Technical Board of Appeal in *Novartis/Transgenic Plant*.[12] The application concerned a patent containing claims to transgenic plants comprising in their genomes specific foreign genes, the expression of which resulted in the production of antipathologically active substances, and to methods of preparing such plants. The EPO had denied registration. The denial was supported by the Technical Board of Appeal on the ground that Article 53(b) denied the patentability of an invention that could embrace plant varieties.

In its decision in December 1999, the Enlarged Board of Appeal indicated that it would favor the application because, in substance, it did not involve an application for a plant variety. This determination contains some useful guidance on the legal definition of plant varieties. The Enlarged Board of Appeal noted that the definitions of plant variety in the UPOV Convention and the Council of the European Union (EU) Regulation on Community Plant Variety Rights refer to "*the entire constitution of a plant or a set of genetic information,*" whereas a plant defined by a single recombinant DNA sequence "*is not an individual plant grouping to which an entire constitution can be attributed.*" The Enlarged Board observed that the claimed transgenic plants in the application were defined by certain characteristics that allowed the plants to inhibit the growth of plant pathogens. No claim was made for anything resembling a plant variety. The board noted that in the case of PBRs, an applicant had to develop a plant group, fulfilling in particular the requirements of homogeneity and stability, whereas in the case of a typical genetic engineering invention, a tool was provided whereby a desired characteristic could be bestowed on plants by inserting a gene into the genome of a specific plant. The board observed that the development of specific varieties was not necessarily the objective of inventors involved in genetic engineering.

4.2 *Patentability outside of Europe*

Outside of Europe the prohibition against the patenting of plant varieties is absent. In the United States, for example, the Federal Circuit resolved any potential conflict between patent protection and protection under the Plant Variety Protection Act in its decision in *Pioneer Hi-Bred*

International Inc. v. J.E.M. Ag Supply Inc.[13] The defendants objected that Pioneer had obtained both patent protection and certificates of protection under the Plant Variety Protection Act for the same seed-produced varieties of corn. The defendants argued that the enactment of the Plant Variety Protection Act had removed seed-produced plants from the realm of patentable subject matter in the Patents Act. The Federal Circuit rejected this argument noting that the Supreme Court held that "*when two statutes are capable of coexistence, it is the duty of the courts ... to regard each as effective.*"

The patenting of plant varieties in Canada was upheld by the recent Canadian Federal Court of Appeal case of *Monsanto Canada v. Schmeiser*.[14] This case concerned the cultivation by a farmer of canola that contained chimeric genes conferring tolerance to glyphosphate herbicides. Monsanto had patented the canola and had marketed these genes in its product Roundup® Ready Canola. Schmeiser had cultivated canola derived from plants on his land that he claimed had developed the tolerance from wind-borne genetic pollination. The trial court found that cultivation of a plant was not an infringement of patented genes contained in that plant; however, the majority of the Federal Court of Appeal agreed with Monsanto that this was infringing use.

Counsel for Schmeiser raised the moral question of whether it was right to manipulate genes in order to obtain better weed control or higher yields. The Federal Court of Appeal ruled that his was a question for the parliament to consider and that the court's job was to "*interpret the Patents Act as it stands.*"[15] The majority explained that, "*Under the present Act, an invention in the domain of agriculture is as deserving of protection as an invention in the domain of mechanical science. Where Parliament has not seen fit to distinguish between inventions concerning plants or other inventions, neither should the courts.*"[16]

As the minority judge pointed out that the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) of the World Trade Organization (WTO), in Article 27.2(b), permits the exclusion of plants from patentability but that plant varieties might be patented. The *Novartis* determination, among others, argues that the addition or modification of genetic material to confer disease resistance is not the creation of a new plant variety. If the view of the majority in Schmeiser that the patenting of a cell confers exclusive patent rights over a plant in which that cell is included, then the Article 27.2(b) exception becomes meaningless.

The Joint Communication of the African Group to the TRIPS Council[17] suggested that Article 29 of the TRIPS Agreement seemed to be the most suitable for an appropriate modification to deal with the issue of patenting plant variety rights, by including the requirements for equity, disclosure of the community of origin of the genetic resources and traditional knowledge, and demonstration of compliance with applicable domestic procedures. Thus the Group suggested that Article 29 be modified by adding the following as paragraph 3:

Members shall require an applicant for a patent to disclose the country and area of origin of any biological resources and traditional knowledge used or involved in the invention, and to provide confirmation of compliance with all access regulations in the country of origin.

4.3 *IP and the research exemption*

Plant breeders have tended to stress the necessity of being able to freely access genetic material, including that which is IP protected. This is why the UPOV Convention contains a broad breeders' exemption. Patent law tends to have a much narrower research exemption, and it is often limited to noncommercial scientific or experimental use.

The narrowness of the research exception in patents law is illustrated by the recent U.S. decision in *Madey v. Duke University,*[18] which held that a university that undertook commercial research contracts could not avail itself of the defense. The ambit of the experimental research exception in patents law in the United Kingdom was examined in *Monsanto v. Stauffer*.[19] In that case, Stauffer had developed a market variant, called Touchdown®, of Monsanto's successful patented weed-killer Roundup® for which Stauffer had obtained provisional clearance from relevant authorities. In order

to obtain final clearances, Stauffer had established tests at its own research farm and also organized a series of tests outside the farm, where interested parties could observe the results. Monsanto moved for an interlocutory injunction, on the grounds of patent infringement, which was granted by the patents court, negating the ground that tests done outside the research farm to check the product in different soil and climatic conditions amounts to an experimental use. The Court of Appeal, although it agreed that tests done outside could not qualify for an experimental-use exception, exempted all trials carried out at Stauffer's research farm and at laboratories and greenhouses in the United Kingdom. The Court limited the interpretation of the word *experimental* in accordance with the size, scale, recipient, and methodology of the experiment. This case has raised uncertainty as to how far university researchers can apply the experimental-use exception to agricultural field trials.[20]

Another illustration of the relative narrowness of the experimental-use exception in patents law, compared with PVP laws, is that while a protected plant variety is covered by a single title, plant-related biotechnological inventions are likely to be protected by a patent and, in some cases, several patents. The patents may cover not just plants, but also seeds, genes, and DNA sequences. The effect of patents is to restrict access to the patented "*products*." It has been argued that "*locking up*" genetic resources with patents is a bad thing because innovation in plant breeding is cumulative and depends on being able to use as wide a stock of material as is possible. The International Treaty on Plant Genetic Resources for Food and Agriculture (the Treaty) introduced a number of provisions to deal with this concern. The provisions are laid out below.

Apart from patents, the restrictions on access to breeding material may have causes other than IPRs. For one thing, some countries have chosen to provide exception for certain categories of plant genetic resources they consider to be strategically important from the Multilateral System to be set up under the Treaty. Also, some developing countries have been exercising their rights under the Convention on Biological Diversity (CBD), administered under the United Nations Environment Programme (UNEP), to regulate access to their genetic resources, and in doing so have restricted the free flow of those resources. This practice may well be detrimental to those countries and others, in terms of long-term food security.[21]

But beyond the issues of how specific IP rights privatize genetic material needed for breeding is the association of IP rights with the privatization of agricultural research, the shrinkage of nonproprietary public sector research, and the increased concentration of ownership of breeding material, research tools, and technologies in the hands of a small number of giant corporations.[22] Not only does this privatization trend toward greater restriction on access reduce the free circulation of breeding material, but it can also make public policy aimed at enhancing food security harder to put into practice. This is true because it is much more difficult for governments to influence companies than the public institutions they partly or wholly fund.

4.4 *Ethical issues relating to the patentability of life-forms*

There is a substantial body of literature on the ethical implications of permitting the propertization of the "*building blocks of life*" or at least to "*reduce the value of life and nature to the merely economic*." The Joint Communication of the African Group to the TRIPS Council on taking forward the review of Article 27.3(b) of the TRIPS Agreement,[23] stated that patents on life-forms were unethical and "*contrary to the moral and cultural norms of many societies in Members of the WTO.*" The Joint Communication invoked the exception in Article 27.2 for protecting *ordre public* and morality as justification for outlawing patents on life-forms.

An important question for which empirical work is required concerns the impact of oligopolization in the biotechnology market on the capacity of international institutions to provide public goods to developing countries in the agricultural sector. The proprietization of enabling technologies, as well as genetic resources, raises concerns about the capacity of the public agri-

cultural research system to fulfill its public-good mission in contributing to the elimination of food insecurity. As Drahos observed, "*in biotechnology and agriculture, it is likely that much research will end up as an international rather than public good and that it will be distributed according to complex licensing structures.*"[24]

In addition to the possible adverse impacts this market concentration might have upon the vigor of competition, the market dominance of these private corporations also has an important influence upon the sort of biotechnological research that is undertaken. For example, to what extent will the dominance of private corporations in biomedical and agricultural research direct that research toward northern concerns and away from southern health problems[25] and southern food priorities?[26] Will the owners of IP rights in key enabling technologies make them available to public research institutions on affordable terms?[27]

Article 27.2 of the TRIPS Agreement permits members to disallow the exploitation of inventions "*which is necessary to protect ordre public or morality, including to protect human or plant life or health or to avoid serious prejudice to the environment…* ." Member states would have to show that the commercial exploitation of the specific invention would be contrary to *ordre public* or morality. In light of the interpretation and application of the equivalent provision within the European Patent Convention, and recently reinforced in the Directive, it is unlikely that this exception would permit a general exclusion of living material from patentability. It is also questionable whether patent offices are the proper bodies to adjudicate the application of moral and ethical issues to the patent system.[28] In any event, the patent offices have abstained from exercising moral judgments in this area. Thus, for example, in *Greenpeace v. Plant Genetic Systems NV*,[29] in an opposition to an application for a patent directed to transgenic plants engineered to be resistant to the herbicide Basta®, Greenpeace argued that it was immoral, and therefore in breach of Article 53(a) of the European Patent Convention, to "*own*" plants that were the common heritage of humankind. The Appeal Board of the EPO sustained the Examination Division's view that it was not the proper forum for discussing the advantages and disadvantages of genetic engineering. Similarly, in *Novartis/Transgenic Plants*[30] the Extended Board of Appeal of the EPO considered the debate over genetic engineering to be too controversial for the board to sustain Greenpeace's opposition to the patent. The Extended Board of Appeal noted that the Directive was an indication that the European Parliament considered there to be some benefit in genetic engineering.

5. PVP, PLANT GENETIC RESOURCES, AND THE TRIPS AGREEMENT

Access to the plant genetic resources of a country is governed by an evolving composite of national legislation pursuant to CBD, TRIPS, UPOV, and the Treaty.

The interrelationship between these instruments has been addressed by the Council on TRIPS pursuant to its review of Article 27.3(b), which commenced in 1999. At a March 2001 meeting of the Council on TRIPS, the chairman set out a list of key issues that had arisen in the review of Article 27.3(b) (IP/C/M/26). These included:

- technical issues relating to patent and PVP under Article 27.3(b)
- technical issues relating to the sui generis protection of plant varieties
- the relationship to the conservation and sustainable use of genetic material
- the relationship with the concepts of traditional knowledge and farmers' rights

Article 27.3(b) of the TRIPS Agreement permits the exclusion from patentability of :

plants and animals, other than microorganisms, and essentially biological processes for the production of plants and animals, other than nonbiological and microbiological processes. However, Members shall provide for the protection of plant varieties either by patents or by an effective sui generis system or by any combination thereof.

However, Article 27.3(b) provides no guidance on what is meant by *effective*, the debate in the TRIPS Council having focused upon which sui generis systems satisfy the obligation. A sui

generis option in the IP context is usually taken to refer to a specially coined IP right, outside of the traditional categories of IP protection. UPOV has advanced its system as the principal workable example of a sui generis PVP system. It is interesting to note that the drafters of the TRIPS Agreement, who felt free to import into the agreement provisions from other named international instruments, such as the Paris, Berne, and Rome conventions and the Washington Treaty on Integrated Circuits, desisted from specifically importing provisions from the UPOV Convention in the area of plant varieties.

The failure of the drafters of TRIPS to define what was meant by sui generis leaves considerable scope for nations in the range of legislation that they may implement in compliance with this provision. One option is to include the benefit-sharing and informed-consent provisions of the CBD in a UPOV-style statute. A problem with doing so is that although the CBD provisions would apply in the countries that introduce them, they will not apply in countries that do not introduce them. In the countries that do introduce the provisions and also adopt an approach based on UPOV 1991 or patents, there is no guarantee of benefit sharing and informed consent, or even of the right to save seed.

The Doha Ministerial Declaration of November 2001, in Clause 19, provided:

We instruct the Council for TRIPS, in pursuing its work programme including under the review of Article 27.3(b), the review of the implementation of the TRIPS Agreement under Article 71.1 and the work foreseen pursuant to paragraph 12 of this Declaration, to examine, inter alia, the relationship between the TRIPS Agreement and the Convention on Biological Diversity, the protection of traditional knowledge and folklore, and other relevant new developments raised by Members pursuant to Article 71.1. In undertaking this work, the TRIPS Council shall be guided by the objectives and principles set out in Articles 7 and 8 of the TRIPS Agreement and shall take fully into account the development dimension.

5.1 *Technical issues relating to patent and PVP under Article 27.3(b)*

The following technical issues are suggested by the terminology of Article 27.3(b):

- What is a patentable invention for the purposes of Article 27.3(b)?
- What are microorganisms for the purposes of Article 27.2?
- What are plant varieties for the purposes of Article 27.3(b)?
- Should there be a research exception in relation to patents over plant material?

5.1.1 *What is a patentable invention?*

IP law attempts to draw a distinction between inventions and discoveries. The latter are not protectable. This distinction may be made in the relevant legislation. For example, European laws based on the Directive, which specifically provides in Article 3.2 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.*"

Of course, it is equally open to a court or a legislature to rule or provide that genetic material is not patentable, even in its isolated or purified form, on the grounds that it is a mere discovery. Indeed, nothing in the TRIPS Agreement obliges countries to deem the isolation of genetic materials to be inventions. A number of developing countries exclude the patentability of genetic materials (Mexico), or of materials existing in nature (Argentina, Brazil, and the Andean Group Decision 486).

5.1.2 *What are microorganisms for the purposes of Article 27.3(b)?*

Article 27.3(b) permits WTO Members to exclude from patent protection plants, animals, and essentially biological processes for the production of plants and animals. Members are specifically not permitted to exclude from patent protection microorganisms and nonbiological and microbiological processes. The language used in Article 27.3(b) implies that a clear distinction can be made between plants and animals on the one hand and microorganisms on the other. However, there is no commonly accepted definition of *microorganism,* either in science or in patent office practice. The lack of any definition permits great variations between members in practicing this exclusion.

The practice of patent offices in developed countries suggests that there is no perceived need for a definition: the key issue for protection being not its subject matter, but whether or not the invention meets the patent-granting criteria.

An invention involving biological material will be regarded as lacking an inventive step if it: (1) merely identifies the biological material; and/or (2) merely identifies the natural function of the biological material. An invention will demonstrate an inventive step if it takes the form of a significant technical application of an identified function of the biological material. This technical application must go beyond a mere simple replication of the natural function of the biological material, and the technical application must represent a significant technical advance on the prior art. What about processes and uses?

An invention involving biological material will be regarded as being capable of industrial application if it can be shown that the invention is capable of being used in a manner that provides a demonstrable public benefit. Public benefit means that the invention must be capable of being used in a manner conducive to public health and to social, environmental, and economic welfare.

5.1.3 *What is a plant variety for the purposes of Article 27.3(b)?*

As noted above, a crucial issue in the establishment of a sui generis regime would be the definition of the protected subject matter. Article 27.3(b) of the TRIPS Agreement requires the protection of "plant varieties," but does not provide (as in the case of inventions) a definition thereof. Therefore, national laws have ample room to determine what is to be deemed a plant *variety* for the purposes of protection. Which are the possible definitions? The law may require certain characteristics for a *protected* variety that may not be essential for a scientific definition.

5.2 *Technical issues relating to the sui generis protection of plant varieties.*

Article 27.3(b) provides no guidance on what is meant by *effective*, the debate in the TRIPS Council having focused upon which sui generis systems satisfy the obligation.

Sui generis systems are generally defined as those that fall outside of the traditional categories of IP protection and are created to deal with a unique category of creativity. The UPOV system has been urged by the industrialized group of countries as the principal workable example of a sui generis PVP system. In excess of 50 states have acceded to the UPOV Convention.

Developing countries in the TRIPS Council have argued that the TRIPS Agreement is in tension with the CBD, particularly with the provisions in the latter convention concerned with informed consent to biological materials and equitable benefit sharing following access.

A communication to the WTO from Kenya, on behalf of the African Group, to assist the preparations for the 1999 Ministerial Conference, suggested that:

"*After the sentence on plant variety protection in Article 27.3(b), a footnote should be inserted stating that any sui generis law for plant variety protection can provide for:*

(i) the protection of the innovations of indigenous and local farming communities in developing countries, consistent with the Convention on Biological Diversity and the International Undertaking on Plant Genetic Resources;

(ii) the continuation of the traditional farming practices including the right to use, exchange and save seeds, and sell their harvest;

(iii) preventing anti-competitive rights or practices which will threaten food sovereignty of people in developing countries, as is permitted by Article 31 of the TRIPS Agreement.

This African proposal is reflected, in part, in clause 19 of the Doha Ministerial Declaration of November 2001 mentioned above.

In order to help countries devise an appropriate sui generis system, the International Plant Genetic Resources Institute (IPGRI, now Bioversity International) came up with a list of key questions that decision makers should take into account.[31] These are as follows:

- What kind of domestic seed industry exists?
- What kind of public breeding sector exists?

- What kind of seed supply system is in place?
- To what extent is farm-saved seed used in the country?
- What is the current capacity of breeders?
- What do local breeders want to do in the next 5–10 years?
- Are external inputs to agriculture low or high?
- What are the country's production needs and objectives?
- What is the country's biotechnology capacity?
- What are the goals and realistic expectations of the biotechnology sector?
- What kinds of strategic alliances will the country want to enter into in the next 5–10 years and how involved will other countries be?

The fact that the answers to these questions will vary widely from one country to another suggests that, as with patents, one size is unlikely to fit all.

6. THE INTERNATIONAL TREATY ON PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Plant genetic resources for food and agriculture (PGRFA) were freely exchanged by the international agricultural research institutes of the Consultative Group on International Agricultural Research (CGIAR), as well as by their national counterparts, on the basis that they were "*the common heritage of humankind*." This principle was embodied in the International Undertaking on Plant Genetic Resources for Food and Agriculture (the Undertaking) adopted by the Food and Agriculture (FAO) Conference in 1983. The Undertaking was adopted as a nonbinding conference resolution. In subsequent years the principle of free exchange was gradually narrowed by the impact of IP rights upon agriculture. In November 1989, the 25th Session of the FAO Conference adopted two resolutions providing an "*agreed interpretation*" that plant breeders' rights were not incompatible with the Undertaking. The acknowledgment of plant variety rights obviously benefited industrialized countries that were active in seed production. In exchange for this concession, developing countries won endorsement of the concept of farmers' rights. A further resolution in 1991 recognized the sovereign rights of nations over their own genetic resources. Agenda 21, promulgated at the Rio Earth Summit in 1992 called for the strengthening of the FAO Global System on Plant Genetic Resources. Resolution 3 of the Final Act to the CBD noted that the access to ex situ germplasm collections, such as those maintained by the CGIAR, and the realization of farmers' rights were the province of the Undertaking. The 1993 FAO Conference called on member states to harmonize the Undertaking with the CBD. Negotiations for revision of the Undertaking to take account of both the CBD and the TRIPS Agreement commenced in November 1994 and were consummated with the adoption of the Undertaking as the Treaty.

6.1 *The main objectives and innovations of the Treaty*

The objectives of the Treaty are stated in Article 1 to be "*the conservation and sustainable use of plant genetic resources for food and agriculture and the fair and equitable sharing of the benefits arising out of their use, in harmony with the Convention on Biological Diversity, for sustainable agriculture and food security.*"

Article 4 of the Treaty requires signatories "*where appropriate*" to "*promote an integrated approach to the exploration, conservation and sustainable use of plant genetic resources for food and agriculture.*" Article 10.2 contains the agreement of the Contracting Parties to "*establish a multilateral system, which is efficient, effective and transparent, both to facilitate access to [PGRFA] and to share, in a fair and equitable way, the benefits arising from the utilisation of these resources, on a complementary and mutually reinforcing basis.*" Facilitated access to PGRFA is to be provided in accordance with the conditions prescribed in Article 12.3. Paragraph (d) of this provision provides that the recipients "*shall not claim any intellectual property or other rights that limit the facilitated access*" to PGRFA, or their "*genetic parts or components,*" in

the form received from the Multilateral System. This, of course, does not prevent IP rights being claimed in relation to germplasm that is modified by the recipient.

Article 13.1 recognizes that benefits accruing from facilitated access to PGRFA shall be shared fairly and equitably under this Article. Article 13.2 envisages that this sharing of benefits includes the exchange of technical information, access to technology, capacity building, and the sharing of monetary benefits from commercialization.

Article 28 provides that the Treaty would enter into force 90 days after accession by 40 countries. Until that date, the Undertaking would remain operative. Having acquired the necessary accessions in March 2004, the Treaty entered into force in June 2004.

The establishment of the Multilateral System was the principal innovation introduced by the Treaty. This asserts the primacy of national sovereignty over biological resources, but, in fact, imposes limitations on countries on their ability to restrict access to other states. Facilitated access has to be provided to the crops, listed in Annex I, that account for a significant part of human nutrition. Member states are obliged to make available all passport data and, subject to applicable law, any other associated nonconfidential descriptive information. In relation to material that is under development by farmers or breeders at the time when access is requested, the Treaty gives the country of origin the right to delay access during the period of development. Two compromises were necessary to secure this right of access: first is the limitation imposed by Article 12 upon recipients seeking IP rights in material obtained under the Treaty; second is the right of donors to receive some form of benefit sharing. Benefit-sharing mechanisms under the Treaty include the exchange of information, access to and transfer of technology, capacity building, and the sharing of benefits arising from commercialization.

The CGIAR Centres signed agreements with the FAO in 1994, placing the acquisitions to their germplasm collections after that date under the trusteeship of the FAO. Under the Treaty, new agreements were invited to determine that the access provisions of the Treaty would govern the Centres' germplasm collections that fell within Annex I list that were collected after the entry into force of the Treaty.

6.2 *Farmers' rights and food security*

Article 9 of the Treaty implements the proposal that was developed under the Undertaking for the recognition of farmers' rights. The policy behind this recognition is stated in Article 9.1, namely that:

The Contracting Parties recognize the enormous contribution that the local and indigenous communities and farmers of all regions of the world, particularly those in the centres of origin and crop diversity, have made and will continue to make for the conservation and development of plant genetic resources which constitute the basis of food and agriculture production throughout the world.

The principal contribution of traditional farmers to agrobiodiversity has been their conservation of landraces, which are crop varieties that are primitive cultivars, developed by local farmers to deal with the local climate and diseases and to cater to local tastes and food-preparation practices.[32] This development may involve the interbreeding of locally occurring undomesticated plants with cultivated plants, as well as the exchange of different genotypes among farmers and farms.[33]

6.3 *Traditional knowledge and food security*

A significant contribution has been made by the knowledge of indigenous peoples and traditional farmers in the development of new crop types and biodiversity conservation. These groups have been an important agency in the conservation of plant genetic resources and the transmission of these resources to seed companies, plant breeders, and research institutions. The contributors have not typically been paid for the value they have delivered, whereas breeders and seed companies have resorted to IP rights to recover their development expenditures.

The economic value of biological diversity conserved by traditional farmers for agriculture is difficult to quantify. It has recently been suggested that "*the value of farmers' varieties is not directly dependent on their current use in conven-*

tional breeding, since the gene flow from landraces to privately marketed cultivars of major crops is very modest"[34] because "*conventional breeding increasingly focuses on crosses among elite materials from the breeders own collections and advanced lines developed in public institutions.*" On the other hand, those collections and advanced breeding lines are often originally derived from germplasm contributed by traditional groups.

An increasingly significant economic value of biodiversity is the extent to which it provides a reservoir of species available for domestication, as well as genetic resources available for the enhancement of already domesticated species. The modern biotechnological revolution has enabled the engineering of desirable genetic traits from useful local species. It is estimated that about 6.5% of all genetic research undertaken in agriculture is focused upon germplasm derived from wild species and landraces.[35]

Traditional knowledge is particularly important in the development of farming systems adapted to local conditions and farming practices. This may enable the utilization of marginal lands, contributing to food security by enabling access to food in remote areas, as well as contributing to the management of the environment by preventing erosion, maintaining soil fertility, and maintaining agricultural biodiversity.

Farmers in subsistence systems have tended to utilize a diverse selection of crop species in order to assure their annual harvests and thus to guarantee a minimal level of production and to prevent food shortage. Seed production in many instances has been on the collection of and domestication of locally known wild varieties. Modern agricultural practices depend on crop species that promote productivity and resistance to disease that can only be maintained with the continuous input of new germplasm. The diversity of landraces and the associated information on their specific qualities contribute invaluable information to formal breeding processes. It has been noted that the loss of biological diversity is paralleled by the loss of traditional knowledge. Where a plant variety becomes extinct, then the entire body of knowledge about its properties is condemned to irrelevancy.

An assumption of Article 9.1 is that the landraces used by traditional farmers are a dynamic genetic reservoir for the development of new varieties and for the transmission of desirable genetic traits. The traditional knowledge of local and indigenous communities is similarly perceived. As a means of remunerating these groups for their past contributions to the development of plant genetic resources for food and agriculture production, there can be little argument, except about the quantum and distribution of this remuneration.

Inevitably, any calculation of the equitable share that traditional farmers and indigenous communities might enjoy under a farmers' rights or traditional knowledge regime will be arbitrary. However, the IP system is no stranger to arbitrary calculations, thus the 20-year length of a patent term is intended to provide an opportunity for the compensation of all inventors, whatever the area of technology. Similarly the 25-year exclusivity, which the UPOV Convention provides for new varieties of trees and vines, takes no account of variations in R&D costs between the different varieties.

The principal ways in which plant genetic resources are translated into food and agriculture production is through plant breeding and plant patenting. Standing at the heart of a farmers' rights regime is the concept of equitable benefit-sharing with farmers for their contribution to innovations in plant breeding and plant patenting. It is estimated that about 6.5% of all genetic research undertaken in agriculture is focused upon germplasm derived from wild species and landraces.[36]

Article 9.2 of the Treaty envisages that "*the responsibility for realizing Farmers' Rights, as they relate to Plant Genetic Resources for Food and Agriculture, rests with national governments*" and that national legislation should include measures relating to:

- protection of traditional knowledge relevant to plant genetic resources for food and agriculture
- the right to equitably participate in sharing benefits arising from the utilization of plant genetic resources for food and agriculture

- the right to participate in making decisions, at the national level, on matters related to the conservation and sustainable use of plant genetic resources for food and agriculture

Article 9.2 obliges the Contracting Parties to the Treaty "*to take measures,*" subject to their national legislation to protect and promote farmers' rights. The content of these rights is defined in the balance of that provision and embraces the protection of traditional knowledge, equitable benefit sharing, and the right to participate in decision making. The Treaty leaves open the legal context within which farmers' rights are to be enacted.

Finally, Article 9.3 provides that the Article shall not be interpreted "*to limit any rights that farmers have to save, use, exchange, and sell farm-saved seed/propagating material.*"

National legislation on farmers' rights tends to combine one of the versions of UPOV with some of the access principles of the CBD. The African Model Legislation for the Protection of the Rights of Local Communities, Farmers and Breeders, and for the Regulation of Access to Biological Resources, which was adopted by the Organization of African Unity (OAU), Heads of States Summit at Ouagadougou in June 1998, adopts a sui generis regime based on UPOV 1991. However, most national statutes prefer access legislation combined with UPOV 1978 (for example, the Andean Community's Common System on Access to Genetic Resources, 1996; Costa Rica's Biodiversity Law of 1998; India's Community Intellectual Property Rights Act of 1999; Kenya's Seeds and Plant Varieties Act of 1975).

7. ASSESSMENT OF THE RELATIONSHIP BETWEEN IP AND FOOD SECURITY

The role of IP in eliminating food insecurity has to be placed in its proper policy perspective. Development experience over the last 50 years attributes rural poverty and food insecurity in developing countries to development strategies that overlooked the importance of the development of the agricultural sector, particularly the production of staple foods.[37] Thus the enhancement of food security in developing countries requires a package of policies that address the supply, distribution and consumption aspects of the food chain. The FAO has noted that the policy options that are available to poor countries are constrained by a number of factors including: (1) limited resources for public spending programs; (2) the dilemma between remunerative prices for producers and prices that a large number of poor households can afford, thus making the option of border protection less attractive despite high bound tariffs; (c) major constraints on foreign exchange availability leading to pressure to boost production of export crops.[38]

Where IP could make its greatest contribution is in the incentivization of beneficial agricultural innovations. Historically, the strongest incentives have been those arising from the marketing of hybrid seeds that provide higher yields, with the commercial benefit to the seed marketer that the seeds of the offspring cannot be used by the farmer because these seeds do not breed true-to-type. As is discussed above, the evidence for incentives to breeding research for crop plants is limited—in developing countries even more so—whether PVP and patenting will be useful in encouraging a national seed industry. Barton suggests that a developing country "*is probably best-off adopting minimum compliance with TRIPS, which requires at least some form of sui generis protection for plants—although there is the possibility that a number of nations with similar agricultural conditions could combine their markets in some way that encouraged private investment. Moreover, use of UPOV-style laws might help in commercializing varieties developed by the public sector.*"[39]

The question of whether a developing country will adopt a sui generis PVP system or a patent-based system, to comply with Article 27.3(b) of the TRIPS Agreement will depend upon the technological sophistication of agricultural research in that country. ■

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