Plant Breeders' Rights: An Introduction

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ABSTRACT

Based on the averages, there is a good chance that your country has decided to fulfill its TRIPS (Trade-Related Aspects of Intellectual Property Rights) Agreement commitments by selecting an "effective sui generis system" over patents for plants, something more commonly known as plant breeders' rights. This chapter attempts to explain what plant breeders' rights are by describing the organization and function of the plant breeders' rights system. Covering the objectives, scope, protection requirements, and examination provisions, the chapter compares the plant breeders' rights system with the patent system and attempts to clarify specific puzzling issues. These include concerns that the latest UPOV Act does not address farmer seed savings (the choice is left to individual countries, with virtually all countries choosing to allow seed saving). Plant breeders' rights are less puzzling once the intent and structure of the system are understood. The system is, in fact, one with very specific, if narrow, objectives.

1. INTRODUCTION

Guild members in mid-15th century Venice, averse to direct competition from former apprentices, passed a law prohibiting the apprentice from entering the trade until about 18 years had lapsed. That edict, according to intellectual property (IP) historians, marked the origins of patents. Indeed, the duration of a patent (20 years from date of filing the application) is said to be modeled after that apprenticeship period in long-ago Venice. Yet some easily copied creations were not granted similar IP protection, in Venice or anywhere else, until many centuries had passed. Plants are one example of this. Food, fiber, and ornamental crops (F_1 hybrids excepted) carry in themselves the ability to regenerate true to form, whether sexually or asexually. Anyone holding a seed or a cutting immediately possesses all the skills of the master to recreate the variety of plant from which the seed or cutting came. Yet not until 1930 (the U.S. Plant Patent Act) did legal restrictions apply to the use of plant materials for regenerative purposes, and even then protection only applied to asexually propagated plants (excluding tubers). An additional 30 years passed before a harmonized format for legislation covering IP protection for all plant varieties emerged. That is the International Convention for the Protection of New Varieties of Plants, or UPOV in its French acronym, an international treaty first adopted in 1961 and revised several times, the latest in 1991. The form of intellectual property created by UPOV is known widely, if informally, as plants breeders' rights (PBR). This chapter describes the acts and modes of operation of PBR under UPOV-compatible national legislation. While every effort is made here to be complete and accurate, it would be impossible discuss all of the considerations needed to appreciate every possible contingency. Persons wanting to learn more should refer to the text of UPOV and other official documents, such as

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at the UPOV Web site.[1] The *Handbook* chapter PBR in the Developing World, discusses the effects of PBR laws and the available alternatives at the national level.

2. WHAT ARE PLANT BREEDERS' RIGHTS?

PBR is a patent-like system that allows the plant variety owner to prohibit specific unauthorized uses of the variety. PBR laws apply only to plants, and hence are among the class of sui generis systems, that is, special purpose systems. Laws applying to computer chips (that is, *mask works* … the set of templates used to manufacture chips) form another sui generis system. In fact, sui generis systems have been applied to everything from aeronautics to Xerox® machines. These systems differ significantly from patent laws. The differences between the two systems—and the similarities—are explained below.

PBRs, like patents and other forms of IP law, are forms of national legislation. That is, protection applies only in countries where protection has been sought and granted. Thus, the owner of a sunflower variety protected in the United States would have no legal control over how that variety was used inside Canada. Critically, however, the variety owner could prevent the importation into the United States of the variety, including (in most cases but depending on the specific country's sui generis laws with regard to plant varieties) grain, plants, plant parts, and, in some countries, even manufactured products produced using the protected variety. In the case of a U.S. PVP-protected sunflower variety, the variety owner could not prevent it from being planted, grown, harvested, or sold inside Canada, but U.S. PVP-protected sunflower seed, sunflower meal, sunflower oil, and similar products could be prevented from entering the U.S. stream of commerce.

PBR under the TRIPS Agreement (Agreement on Trade-Related Aspects of Intellectual Property Rights) is a component of the World Trade Organization (WTO). Signatories of WTO (currently about 150) are committed to comply with the TRIPS requirements of a harmonized minimum level of IP rights protection. Although the TRIPS text is quite exhaustive in most regards, only a single sentence refers to PBR. Article 27.3(b) reads, in part, that WTO members must provide plant variety patents, "*an effective sui generis system,*" or both. Most countries new to protecting plants are opting for PBR over patents. PBR is clearly a sui generis system, but what constitutes "effective" is less clear.

3. WHAT ROLE DOES UPOV PLAY?

If PBR is based on national law, what role does UPOV, an international convention, play? Essentially, UPOV establishes a framework law that may be adopted by countries into their own national laws. After having done so, a country could submit its national law to the governing body of UPOV for evaluation and, if the law was found to have similar critical elements, the country could become a UPOV-signatory nation. In practice, there is usually an informal assessment done by UPOV prior to final diplomatic submission. UPOV does provide a mechanism for harmonizing national laws and providing standardized definitions/interpretations of terms. UPOV also requires nondiscrimination against foreign applicants of other Union members (National Treatment, Article 4 of 1991 Act). However, that Article has largely been supplanted by the geographically broader national treatment requirements of TRIPS (Article 3). UPOV member states have training and other technical support available to them, although an annual membership fee based on national income is imposed. Countries can and do have PBR systems without joining UPOV, but little is known about their operation and few countries have implemented them. Since its inception, UPOV has adopted four acts (1961, 1972, 1978, and 1991). Members may at their discretion adopt a more recent Act, but older acts are closed. Presently, the 1991 Act is the only one now open to new members. There are some important differences between the 1978 and 1991 acts, to which essentially all current members belong. These differences are discussed below. All terms and references here refer to these acts. There are some national-level differences, but for the most part identifying them involves a greater level of detail than is possible here.

4. HOW DO PBRS WORK?

PBR systems, like other IP systems, have three major components:

1. Definition/identification of protectable subject matter
2. Requirements that must be met to receive protection
3. Rights of the variety owner

4.1 *Identifying what can be protected*

As a sui generis system, protection is limited to plant "varieties," but this term lacks a standard definition. The definition in the 1991 Act (Article 1(vi)) reads in part:

a plant grouping . . .

- defined by the expression of the characteristics …
- distinguished … by the expression of at least one of the said characteristics and
- *[having] suitability for being propagated unchanged*

Beyond its technical relevance, this definition is significant since it departs from the language of earlier acts. The 1978 Act lacked any such definition, while the 1961 Act (Article 2.2) refers to a variety as "*any cultivar, clone, line, stock, or hybrid which is capable of cultivation….*" Certainly, one purpose for defining variety is to distinguish what is protectable under UPOV from those "plant genetic resources" that fall under the Convention on Biological Diversity (CBD). As a general matter, a plant variety under UPOV would also be a plant genetic resource as defined by the CBD. Furthermore, the international convention typically (but not universally) allows the more recent convention to supercede the prior one. The CBD was ratified in 1992 and went into effect in 1993. However, the CBD (Article 16.2) does provide for the "*adequate and effective protection of intellectual property rights*," so PBRs would seem to operate independently of national laws enacted under the CBD, although exceptions could arise. There might be conflict, for example, over traditional farmer-bred varieties, often referred to as landraces. Landraces are certainly genetic resources and, arguably, plant varieties. However, as a practical matter, heterogeneous landraces rarely satisfy the uniformity and stability requirements for PBR protection, so a conflict in practice seldom arises. This does not mean that a landrace is specifically excluded from PBR protection, or that one could not be protected. Rather, the UPOV protection requirements demand more specific attention to a landrace (such as backcrossing), so the issue of whether, or not, landraces qualify for PBR protection actually seldom arises. As to UPOV, it is quite evident that the system is intended for planting materials, whether they are food crops or horticultural varieties, that will be sold on a commercial basis.

Another area of potential overlap is with the offering of patents and PBR for a plant. The TRIPS Agreement specifically allows patents for plants, and, in the United States, both forms of protection have been available for some time. The matter has, however, not been so straightforward in E.U. countries, due to the adoption of the European Patent Convention (EPC). The EPC (Article 53(b)) excludes protection for "plant or animal varieties," raising the question of just what the appropriate definition of *variety* is. Rulings on this question have seesawed back and forth for decades, but the current (and likely sustainable) rule is that a plant variety is in a fixed form regarding all of its characteristics. An invention that is applicable to a number of varieties is not a plant variety and is thus patentable. This interpretation, while not binding in other countries, is of relevance since Article 53(b) wording has been adopted into the patent laws of a number of other countries.

4.1 *Protection requirements*

To be eligible for protection under UPOV-based laws, a variety must be (Article 5, 1991 Act, Article 6, 1978 Act):

- new
- distinct
- uniform
- stable

These requirements are often abbreviated as DUS. Newness (or novelty) requires that the applicant variety has not been "*sold or otherwise*

disposed of to others" for more than one year in the country of application or for four years (six for trees or vines) elsewhere. This requirement assures that the public is not giving away exclusivity rights to something already available, while recognizing that some limited use or testing will typically be required prior to application.

Uniformity and stability necessitate a certain amount of backcrossing, so that the variety reproduces true to form across individual plants (uniformity) and across generations (stability). Stability and uniformity serve the important function of making a variety identifiable after propagation. The two also serve important commercial needs. UPOV has sometimes been criticized for promoting genetic uniformity through the stability and uniformity requirements. The text reads "*sufficiently uniform in its relevant characteristics*" (Article 8, 1991 Act) and "*stable [in] its relevant characteristics*" (Article 9, 1991 Act). That is, stability and uniformity are required only to a degree, and only in certain characteristics. The requirements are variable and limited, beyond which a protectable variety can be as heterogeneous as is feasible from the prospective of UPOV. Commercial requirements may necessitate broader uniformity, but this is not relevant to UPOV. Rather, distinctness is the driving characteristic: "*A variety shall be deemed to be distinct if it is clearly distinguishable from any other variety whose existence is a matter of common knowledge at the time of the filing of the application*" (Article 87, 1991 Act). The wording in the 1978 Act (Article 6.1(a)) is nearly identical, except for the inclusion of "*by one or more important characteristics.*" That is, the variety must be distinguishable by one or more characteristics, such as flavor, color, or virus resistance. What characteristics are considered to be distinguishing ones is a matter of national interpretation.

4.3 *Rights of variety owner*

Under the 1978 Act (Article 5.1), the permission of the owner is required for:

- production, for purposes of commercial marketing
- offering for sale or offering marketing rights to reproductive or vegetative propagating material

To those activities, the 1991 Act (Article 14.1) added the following activities for which permission of the owner must be given:

- production or reproduction (multiplication)
- conditioning for the purposes of propagation
- exporting
- importing
- stocking for any of [these] purposes

The specificity of these rights enhances the ability of the rights owner to exclude access, the only right granted by PBR and other IP rights systems. For example, under the 1991 Act, it is sufficient to show unauthorized reproduction, while the 1978 Act required proof of intent to "*commercial[ly] market*" the material. Similarly, under the 1991 Act (Article 14.2) protection is extended to "*harvested materials, including entire plants or parts of plants.*" This means, for example, that the blooms from an unauthorized propagation of a rose variety overseas can be barred access. Under the 1978 Act (Article 5.4), such an extension of protection was optional. Finally, under Article 14.3 in the 1991 Act, a signatory country may choose (but is not required) to extend protection to "*products made directly from harvested material of the protected variety.*"

Two important exceptions to these rights exist. First, protected varieties may be used for breeding and experimental purposes (Article 15.1, 1991 Act and Article 5.3, 1978 Act). This is a right mandated by UPOV, and typically referred to as *breeders' rights*. The freedom to use the variety resulting from the breeder's effort, however, differs between the two acts. It is an important and arcane enough issue to warrant separate treatment.

The second major exception to the rights listed above is the right of a grower (farmer) to retain the crop as a seed source for a subsequent season. This right is absolute under the 1978 Act because, as there is no commercial marketing involved, it is not prohibited. The 1991 Act (Article 15.2) makes this right (typically known as the "farmer's privilege") optional. This Article

is sometimes misconstrued as the elimination of the farmer's privilege, when what it really does is allow each nation to choose. At present, almost all countries have chosen to retain the farmer's privilege. A notable distinction is the European Union, which requires farmers to pay a royalty on saved seed. "Small" farmers are exempted. Note also that this right is completely different and separate from Farmers Rights as defined by the Food and Agriculture Organization of the United Nations (FAO).

Under UPOV, the PBR protection period is a minimum of 15 years, which extends to 18 years for woody plants under the 1978 Act (Article 8). The 1991 Act (Article 19.2) extends the periods to 20 and 25 years respectively.

4.3.1 *Testing (examination) methods*

According to the 1991 Act, "*Any decision to grant a breeder's right shall require an examination for compliance with the [protection] requirements*" (Article 12, 1991 Act). The wording of Article 7, 1978 Act, is similar. Signatory countries nonetheless have substantial latitude in how to conduct the examination. The distinctness requirement does, however, require a comparison with "*any other variety whose existence is a matter of common knowledge at the time*." Thus, at a minimum, a national examination system must maintain (or have access to) a large database of variety descriptions, both protected and not protected, including varieties used both inside and outside the country. Beyond that, countries exercise considerable flexibility. The E.U. nations, for example, carry out a two-year field trial where the applicant variety is compared to an established reference variety. Distinctness is recognized only in specified characteristics by crop, and sometimes a quantitative basis is defined by a "crop committee." For example, an onion variety may be distinct in resistance to sprouting if 3% fewer sproutings occur than in the reference variety after X months of storage. As a variation of this approach, some countries (such as Canada) require the applicant to conduct the growouts (field evaluation of the variety) under the supervision of the plant variety office. Most PBR offices are within a ministry of agriculture. Using the opposite approach is the United States, where growouts are rarely undertaken. Instead, the claim of the applicant is essentially taken at face value. Moreover, distinctness may be claimed in any characteristic, including in those of no practical value. Improper claims of distinctness are resolved in court between the parties. To date there have been few if any court cases resulting from improper claims. From an economic perspective, the U.S. approach is simpler and less costly, while allowing more rapid access to new varieties. Because a variety is protected, however, does not necessarily mean it has agronomic merit. Cosmetic breeding ("cosmetic" traits do not contribute to the productivity of the crop, for example, flower color for pulses) raises costs, although the proliferation of available varieties would reduce their market prices. Choosing a single approach, or choosing to adopt a combination system, is a significant national decision. The U.S. approach does rely more on an efficient and transparent court system, something not available everywhere. To emphasize that point, a study done of Argentina's PBR act (one of the first in a developing country) determined that such a system of PBR would not be effective until the rights could be adequately enforced.

4.3.2 *Initial and dependent varieties*

The 1991 Act (Article 14.5) does add a significantly new component: that of essentially derived varieties. This component provides an exception to breeders' rights: protected materials may still be used in a breeding program, but if the resultant variety is judged to be essentially derived, it cannot be commercialized without the permission of the initial variety's owner. Before considering the technical aspects of this article, it is perhaps helpful to consider several justifications. If the background or development breeder spends 15 years breeding disease resistance from a wild relative into a commercial variety, then under the 1978 Act provisions, the resultant variety could be used as a basis of subsequent breeding, and within a few years competitive varieties would appear. The development breeder would then have difficulty recovering the costs of the 15 years of work, meaning that, as a practical matter, background breeding would have to be left to the public

sector. The owner of a leading commercial variety would be in a similar situation regarding the insertion of a genetically modified trait by another party. Under the 1978 Act, if herbicide resistance had been produced by cross-breeding patented genes into that leading commercial variety, then the resulting genetically modified herbicide-resistant variety could be commercialized, with nothing owing to the original variety owner. Yet that original variety owner would be prevented from using the patented genes in its breeding program, thus producing a distinct asymmetry of rights. Article 14.5 is intended to correct this imbalance by establishing two levels of protection:

- Initial varieties are those on which essentially derived varieties depend. If the initial variety is protected, these essentially derived varieties can be bred from an initial variety but not commercialized without permission from the variety owner. Essentially derived varieties are often referred to informally as *dependent varieties.* If the background-bred variety were an initial variety, any minor derivative varieties would be dependent and, in practice, could expect to pay royalties. UPOV (Article 14.5(b), 1991 Act) uses terms such as "*predominately derived*."
- Other varieties retain the expression of the "*essential characteristics*." Essentially derived varieties may be produced in a number of ways, including by selection, back-crossing, or transformation by genetic engineering. Several UPOV-associated committees have used words such as "*the preponderance of genetic material*." Just how initial and derived varieties are distinguished can be quite critical, but this may not be clearly determined until there are actual decisions settling disputes revolving around this issue. We do know that many national PBR offices are treating the matter as an infringement, that is, the self-identified initial-variety owner is left to sue the purported dependent-variety holder, and it is up to the courts to resolve the counterclaims. This approach relieves a national office from having to making difficult distinctions, but could prolong the process of identifying operational definitions.

5. HOW DO PBRS COMPARE WITH PATENTS?

There are more similarities than differences between patent and PBR systems. Both operate by temporarily privatizing something that would otherwise have been freely available in the public domain. A fee can be assessed for access as well as for any rewards derived through market sales. In their particulars, however, critical differences exist between PBRs and patents.

5.1 *Protection requirements*

Protection requirements for patents include novelty, inventive step (nonobviousness under U.S. law), and utility (or industrial application). The concept of novelty in the two systems is similar, although most patent systems operate with absolute novelty, or no prior public disclosure. Inventive step in the patent system is similar to the distinctness requirement in the PBR system. Patents have always operated with a dependency-type system similar to the initial variety concept in the 1991 UPOV Act, except that in the patent system there are no statutory (text-based) statements about the dependency relationship or how dependency might be achieved. A dependent patent could, for example, be an improvement on an existing product or process or a new use for an existing product. The new product/new use could be protectable in its own right, so that neither owner could use the other invention without permission. These details are worked out between interested parties.

The utility requirement, stated as simply as possible, means that some use for the product must be identified. When applied to patents for genes and gene fragments, the utility requirement has raised serious issues that generally do not exist for PBR. Protected varieties, as noted, are intended for sale and, under many examination systems, must display some practical merit. Uniformity and stability have no comparable requirements under patent law.

5.2 *Protectable subject matter*

With respect to protectable subject matter, the patent and PBR systems are quite different from each other. Under patent acts, everything is pat-

entable except for identified exceptions. One common exception is for "*plant and animal varieties.*" PBRs cover all genera and species, with certain minimums under the several acts, as follows:

- 1978 Act (Article 4): on adoption, three rising to at least 24 genera or species within eight years
- 1991 Act (Article 3): for new members on adoption, at least 15 genera or species, rising to all genera and species within ten years

5.3 *Other components*

PBR systems are distinct from patents in allowing an option, under the 1991 Act, for farmers to save seed for subsequent seasons. Under patents, such actions would constitute infringement. The breeder's right is statutory with PBR and hence is relatively clear in its scope. National patent systems do allow some research on patented inventions, but the form and extent of research allowed is based on case law and so this is more difficult to assess. The difference in this matter between patents and PBR is one of clarity alone; however, this makes research use under PBR a more clear-cut process than for patented inventions. Provisions for farmer's privilege (where allowed) and breeders' rights are generally considered to give holders of PBR certificates weaker protection than do patents. This helps explain why, where the choice is available, commercial breeders often prefer patents, or patents plus PBR, over PBR alone.

Patents are, however, typically far more costly to apply for and to maintain. The difference is not in the application fees structure, which may in fact be lower for patents, but rather, a patent usually requires an attorney's assistance to prepare the application. PBR applications are typically completed by the breeders. Adding the elaborate translation requirements under some patent laws, and the annual maintenance fees can also make patenting a costly process, compared with PBR.

6. CONCLUSIONS

Although some legal ambiguity does still exist within PBR legislation, the objectives of the system are specific, and the laws and provisions, if clearly understood, are manageable. The PBR system shares several features with more conventional patent systems, but the two systems differ in several crucial respects. As a sui generis system, PBR laws apply only to plants and plant materials. But they work, like patents, to prohibit unauthorized use of these materials.

UPOV establishes a framework to guide signatory nations in adopting PBR provisions in their own national laws. The acts have been amended several times; currently, most nations are operating under either the 1978 or the 1991 versions.

To be eligible for protection, a plant variety must demonstrate novelty, distinctiveness, uniformity, and stability. If protected, a potential user must seek permission from the owner before producing, selling, importing, or exporting the variety or, in some cases, products made from or with that variety. A few important exceptions to this apply; for example, a breeder's exemption allows researchers to use the variety for experimental purposes, and farmers are generally allowed to retain the variety for seed. In an important new component of the 1991 Act, if research produces a variety judged to be essentially derived from a protected variety, it cannot be commercialized without the permission of the initial variety's owner. ■

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1 www.upov.int.