The Statutory Toolbox: Plants

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ABSTRACT

Different forms of intellectual property protection are available for agri-biotech inventions: utility patents, plant variety protection, plant patents, trade secrets, geographic indications, trademark, and copyright. Each form has its own strengths and weaknesses. In general, stronger protections require meeting more stringent requirements. The three most important regimes for agri-biotech inventions are utility patents, plant variety protection, and trade secrets. A careful consideration of the relative demands and benefits of each regime will allow custom-tailored approaches to suit the needs of the inventor and the nature of the invention.

1. INTRODUCTION

Several intellectual property (IP) regimes protect agricultural biotechnology. They may be used alone or in combination. In general, the easier it is to obtain a particular form of IP protection, the weaker the protection it affords. Conversely, the more robust the protection, the more stringent are the requirements for obtaining it. This chapter provides an overview of the various forms of IP that are available for protecting agricultural biotechnology innovation.

2. PATENT AND RELATED REGIMES

Patent and somewhat patent-like IP protection regimes provide the most important protection for agricultural biotechnology innovation. In general, a patent grants an inventor of a novel, nonobvious, and useful invention an exclusive monopoly of fixed duration in exchange for public disclosure of the invention. Patent and related regimes offer the strongest IP protection. It is not mutually exclusive, and concurrent protection under multiple regimes is permitted. This section describes the utility patent, plant variety protection, and plant patent regimes, exploring the advantages and disadvantages of each regime.

2.1 *Utility patents*

The first regime, the utility patent, provides the most extensive coverage for inventions. In the context of agricultural biotechnology, the utility patent may be obtained to protect everything from genetically modified seeds and genetically modified plants, to transformation methods. Under the U.S. statute governing utility patents:

> *Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent thereof, subject to the conditions and requirements of this title.*[1]

Plants are eligible subject matter for utility patent protection under the category of "compositions of matter."

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2.1.1 *Scope of protection*

In the United States, utility patents grant a broad right to exclude others from making, using, offering to sell, selling, or importing into the United States, the patented invention.[2] Unauthorized exploitation of the patented invention by others within the patent term constitutes patent infringement. The broad scope of protection afforded by utility patents provides great flexibility for tailoring protection to various plant innovations.

Utility patents may cover individual components of a plant, including the plant's genome, cells, cell culture, and tissues, as well as methods for making the plant. For example, Monsanto, an agrichemical corporation, holds U.S. patents on Roundup Ready® soybeans, which are genetically modified to withstand the company's broad-spectrum herbicide, Roundup®. The company creates Roundup Ready® soybeans by inserting a gene sequence that allows the plant to survive the herbicide. Monsanto's utility patents allow the company to claim protection not only for methods of producing the Roundup Ready® soybeans, but also for the DNA molecule that encodes the herbicide-resistant trait, for the herbicide-resistant plant cell, for the seed of the herbicide-resistant plant, and for the final Roundup Ready® soybean plant itself.

A utility patent may also cover multiple varieties at once. And if the applicant meets the disclosure requirements discussed below, the patent can cover an entire species or genus. Moreover, the scope of the protection is broader than the specific plant variety developed. Under the patent law's doctrine of equivalents, trivial variations to an invention that may not fall within the literal terms of the claims of the patent may nevertheless infringe as an equivalent of the claimed invention.

2.1.2 *Requirements for obtaining a utility patent*

To obtain the protection of a utility patent, an applicant must meet the highest threshold for acquiring IP protection: an invention must be *new*, *useful*, and *nonobvious*.[3] First, it is considered new if it is not already known to the public.[4] An invention fails to meet the novelty requirement if it was in public use, was described in a printed publication, or was covered in a preexisting patent. In the United States, there is a one-year grace period on the bar on public use and printed publication. Second, an invention must be useful, that is, capable of providing a specific benefit.[5] Failure to identify a specific use for a gene sequence renders the gene sequence ineligible for patent protection. Finally, an invention must be nonobvious, that is, the invention is not obvious to a person of ordinary skill in the art. The nonobvious requirement takes into account the scope and content of the prior art and the level of ordinary skill in the pertinent art. Patent may be denied if the invention is a combination of previously known components A, B, and C, and the idea to combine the components A, B, and C were obvious to a person of ordinary skill in the art.

At minimum, a patent application must contain specifications and at least one claim. In the specifications, an applicant must disclose in writing what the applicant believes he or she has invented. The specifications must describe the invention in sufficient detail to enable others of ordinary skill in the pertinent art to practice the invention.[6] For example, in an application claiming DNA as the invention, a description of the DNA is adequate if it includes a definition of the physical properties, formula, chemical name, or structure of the claimed invention; a description that merely states that DNA is involved in the invention falls short of the requirement. In situations where the starting materials required to practice the invention are not readily available to the public, the applicant may also be required to place the materials in a depository in order to fulfill the enablement requirement. The written description of the invention must also reveal what the inventor believes is the best way to practice the invention.

The claims in a patent define the boundaries of a patentee's right to exclude. The patent application must therefore describe what the inventor claims as his invention, by including

> *…one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.*[7]

Ideally, claims should be both broad enough to afford the patentee a wide scope of protection, and narrow enough to avoid invalidation by the prior art. In general, claim language that contains fewer limitations provides broader patent protection than claim language that includes many limitations. Consider the following two simplified claims for a bucket:

A claim that reads:

A bucket comprising a wooden circular bottom, wooden side walls, and a stainless steel handle

provides narrower protection than a claim that reads:

A bucket comprising a bottom, side walls, and a handle

A competitor's metal bucket with a square bottom would fall outside the claim language of the first example, but would infringe the second example by falling within its claim language.

Additionally, claims may be classified as either independent or dependent. Independent claims generally are the broadest claims and do not refer to any other claim in the patent. Dependent claims, on the other hand, incorporate other claims by reference and add additional limitations. Consequently, dependent claims provide a narrower scope of protection than independent claims. Consider the following example:

I claim:

1. a bucket comprising a bottom and side walls
2. the bucket of claim 1 further comprising a handle
3. the bucket of claim 2 wherein the bottom and side walls are wooden
4. the bucket of claim 2 wherein the bottom is circular

In this example, claim 1 is the independent claim. Claims 2 through 4 are the dependent claims that rely on claims that have come before. Ultimately, a patent covers only what the applicant describes and claims in the patent application.

2.1.3 *Procedure for obtaining a patent*

a) Patent protection in the United States. In the United States, utility patents are administered by the Patent and Trademark Office (PTO), an arm of the U.S. Department of Commerce. The PTO receives and examines applications and has power to grant patents if it is convinced that the invention is new, useful, nonobvious, and meets other conditions and requirements as set forth in the statute.[8] The first step in acquiring a patent is to file a patent application with the PTO. Thereafter, a series of communications between the applicant and the PTO follows. Six months to two years after the filing date of the patent application, the PTO will send communications to the applicant known as an Office Action. This communication notifies the applicant of whether the claims have been allowed and provides reasons for rejections of claims. The applicant then has a chance to respond to the PTO within a time specified in the Office Action, typically three months. The applicant may amend the application to overcome the rejections. Two to six months after the PTO receives the applicant's response to the Office Action, the PTO may send another Office Action to the applicant or it may send a Notice of Allowance. A Notice of Allowance indicates that the PTO has allowed all of the claims in the application. A patent will issue after the applicant pays an issue fee.

Once granted, utility patent protection lasts for a term of 20 years, measured from the date the patentee filed the application. It is not subject to exemptions from enforcement. During the term of the issued patent, the patent holder must pay periodic maintenance fees to the PTO.

b) International patent protection: The Patent Cooperation Treaty (PCT).[9] In the current global economy, an inventor may wish to procure patent protection for his or her invention in more than one country. A patent confers rights, however, only in the jurisdiction in which the patent application was filed. Outside of the country where the patent is issued, others are free to use the invention without incurring patent infringement liability. A patent that issues in the United States, for example, confers no automatic patent protection for the invention in France. To protect an invention internationally, an inventor must secure a patent in each country in which he or she desires protection.

Many nations have adopted international agreements that make the process of obtaining multiple patents easier. One of these agreements is the Patent Cooperation Treaty (PCT). The PCT, administered by the World Intellectual Property Organization (WIPO), is an international agreement that streamlines the process of securing patents for an invention in multiple countries. A patent applicant may seek simultaneous patent protection in multiple countries by filing a single application and designating the countries where protection is desired. While PCT does not alter the substantive requirements of patentability in each country, it does eliminate the duplicative effort wasted in filing separate patent applications for the same invention.

An inventor who wishes to take advantage of the PCT, first files an application in his or her home patent office, designated the Receiving Office. The home office conducts an initial prior art search and gives the applicant the opportunity to request an international preliminary examination. The preliminary examination, while not binding, indicates the patentability of the invention, which may assist the applicant in deciding whether to commit to an expensive filing abroad. In the next step, called the "national stage," an applicant has 30 months to convert the PCT application into parallel patent applications in the countries in which he or she desires patent protection. From there, the patent application process proceeds according to the procedures established by each designated country.

2.1.4 *Rights of the inventor*

A patent grants its owner the right to exclude others from making, using, offering for sale, and selling the patented invention without the patent owner's permission. Patents are personal property and therefore may be licensed or assigned to others, including companies. An assignment transfers the rights of the patent from the current owner to a new owner. In contrast, a license grants a revocable permission to engage in conduct that would otherwise constitute patent infringement without transferring ownership of the patent. Licenses may be either exclusive (issued strictly to one licensee) or nonexclusive (issued to several licensees at once).

2.2 *Plant variety protection*

While utility patents provide the most robust protection for plant innovation, only a few countries afford utility patent protection for agricultural biotechnology. A more common regime is plant variety protection, also known as plant breeder's rights. In general, plant variety protection provides a sui generis form of IP protection to breeders of new varieties of plants.

2.2.1 *International protection: UPOV– The International Convention for the Protection of New Varieties of Plants*

Many countries with a system for protecting new varieties of plants have based it on the International Convention for the Protection of New Varieties of Plants (UPOV Convention).[10] Originally adopted in Paris in 1961 with the objective of providing IP protection for new plant varieties, the UPOV Convention has undergone several revisions, first in 1972, again in 1978, and most recently in 1991. The International Union for the Protection of New Varieties of Plants (UPOV), an intergovernmental organization headquartered in Geneva, Switzerland, administers the UPOV Convention.

The UPOV Convention defines a minimum scope of protection that enables plant breeders to prohibit the unauthorized exploitation of their protected variety. Under the UPOV Convention, the authorization of the breeder of an eligible plant variety is required to produce or reproduce, condition for the purpose of propagation, offer for sale, sell, export, import, and stock the propagating material of the protected variety. Where the plant breeder has not had a reasonable opportunity to exercise his or her rights as to the propagating material, the same rights are extended to the harvested material of the protected variety. The rights also attach to varieties "essentially derived" from the protected variety, varieties "not clearly distinguishable from the protected variety," and varieties that "require the repeated use of the protected variety."[11] The Convention explains that "essentially derived varieties" are those that

…may be obtained, for example, by the selection of a natural or induced mutant, or of a somaclonal variant, the selection of a variant individual

from plants of the initial variety, backcrossing, or transformation by genetic engineering.[12]

To obtain plant variety protection, UPOV must examine an application to ensure that the proposed variety meets the conditions for protection. To qualify for UPOV protection, a plant variety must be:

(i) distinct from existing, commonly known varieties,
(ii) sufficiently uniform,
(iii) stable, and
(iv) new in the sense that they must not have been commercialized prior to certain dates established by reference to the date of the application for protection[13]

Once granted, UPOV dictates that plant breeder's rights shall last for at least 20 years; for trees and vines, the term should endure for no less than 25 years from the date of the grant.

UPOV also defines acts that are exempt from the plant breeder's rights. The plant breeder's permission is not required for acts done privately and for noncommercial purposes, experimental use of the protected variety, and acts done for the purpose of breeding other varieties. In addition to the compulsory exceptions, an optional exception allows farmers to save harvested seeds for replanting.

Member nations of the UPOV Convention agree to adopt all measures necessary to implement the plant breeder's rights as outlined in the Convention and to extend to foreign nationals the same rights it provides to its own citizens. Implementation of the Convention entails the establishment of legal remedies and enforcement mechanisms for breeder's rights, as well as the designation of an authority entrusted with the power to grant such rights to applicants. UPOV provides the basic framework for plant variety protection. However, since countries are free to tailor their laws to domestic circumstances when implementing the provisions of the UPOV Convention, different countries have adopted slightly different versions of the plant variety protection regime.

2.2.2 *Protection in the United States: The Plant Variety Protection Act (PVPA)*

The United States is a member of UPOV, having implemented the UPOV Convention in 1981. Plant variety protection certificates, issued by the Plant Variety Protection (PVP) Office of the U.S. Department of Agriculture (USDA), supply patent-like protection for new varieties of seed-bearing plants and may be obtained to protect new plant varieties. Governed by the Plant Variety Protection Act (PVPA), rights are granted to

[T]he breeder of any sexually reproduced or tuber propagated plant variety (other than fungi or bacteria) who has so reproduced the variety, […] subject to the conditions and requirements of this Act.[14]

The PVPA protects discrete varieties from unauthorized exploitation by others. Following the UPOV Convention, a PVP certificate grants its holder the right to exclude others from selling, offering for sale, reproducing, importing or exporting the protected variety, and from using the protected variety to produce (as distinguished from to develop) a hybrid or different variety. As per the UPOV Convention, protection under the PVPA extends not only to the protected plant variety, but also to "essentially derived varieties," narrowly defined in the PVPA to include two generations of derivation. The PVPA defines the term as a variety that:

- *…is predominantly derived from another variety (referred to in this paragraph as the "initial variety") or from a variety that is predominantly derived from the initial variety, while retaining the expression of the essential characteristics that result from the genotype or combination of genotypes of the initial variety*
- *is clearly distinguishable from the initial variety*
- *except for differences that result from the act of derivation, conforms to the initial variety in the expression of the essential characteristics that result from the genotype or combination of genotypes of the initial variety.* [15]

Inclusion of essentially derived varieties within the limits of the breeder's rights guards against acts that border on blatant copying. Essentially derived varieties delineate a zone of protection around the protected variety that captures plants produced by inducing minor changes to a protected variety. As an example, a hybrid variety of corn produced from a protected variety may exhibit cosmetic differences that make the hybrid distinct from its parent; but as an essentially derived variety, the hybrid nevertheless falls within the scope of PVP protection for the parent.

As required by the UPOV Convention guidelines, the PVPA includes several exceptions that shield certain acts from infringement liability. Private noncommercial use of a protected variety does not constitute infringement.[16] Saving seed for replanting *"a crop for use on the farm"* and sale of such seeds *"for other than reproductive purposes"* also do not constitute infringement.[17] Also, the PVPA explicitly provides a research exemption. The statute states that "*use and reproduction of a protected variety for plant breeding or other bona fide research shall not constitute an infringement of the protection provided under this Act.*"[18]

Furthermore, though not an exemption from infringement liability, the PVPA is subject to a requirement that allows the secretary of USDA to declare a compulsory license allowing use of the protected variety for two years, in exchange for a royalty, if such action is deemed necessary for the public interest to maintain a sufficient food supply. The many exceptions to the PVPA allow others, under certain circumstances, to exploit a protected plant variety without the owner's authorization and therefore diminish the strength of plant variety protection.

As a trade-off for the narrower scope of protection, the PVPA demands a lower threshold for obtaining protection. Unlike the utility patent, the PVPA does not call for rigorous disclosure of the claimed invention, nor does it impose a nonobvious requirement. Instead, applicants for a plant variety protection certificate must show that the variety qualifies for protection, must provide a description of the variety, and must deposit seed in a repository.

To qualify for protection under the PVPA, a plant variety must be new, distinct, uniform, and stable. The statute defines each of these terms. First, a variety is "new" if "*the variety has not been sold or otherwise disposed of to other persons*" for more than one year before the date the applicant filed the application for PVP.[19]

Second, a variety is "distinct" if

… *the variety is clearly distinguishable from any other variety the existence of which is publicly known or a matter of common knowledge at the time of the filing of the application*. [20]

Moreover,

… [*t]he distinctness of one variety from another may be based on one or more identifiable morphological, physiological, or other characteristics (including any characteristics evidenced by processing or product characteristics, such as milling and baking characteristics in the case of wheat) with respect to which a difference in genealogy may contribute evidence*.[21]

Third, a variety is "uniform" when

… *any variations are describable, predictable, and commercially acceptable.*[22]

Finally, a variety is "stable" if

… *the variety, when reproduced, will remain unchanged with regard to the essential and distinctive characteristics of the variety, with a reasonable degree of reliability commensurate with that of varieties of the same category in which the same breeding method is employed.*[23]

Once a plant protection certificate issues, the term of protection lasts for 20 years from the date of issue of the certificate, or 25 years in the case of a tree or vine.[24] Unlike utility patents and plant patents, which must issue under an individual inventor's name, a plant variety protection certificate may issue in the name of a corporation, which allows a corporation to file under its own name. Additionally, as a requirement for maintaining PVP, the certificate holder must periodically replenish the repository of

seeds of the protected plant variety. The PVPA does not, however, require payment of maintenance fees for the certificate. When compared to a utility patent, the scope of protection under the PVP regime is limited. But one advantage of the PVPA is the immediacy of protection: as soon as a plant variety protection application is filed and the fee is paid, provisional protection attaches to the plant variety. By marking the seed with protection notices "Unauthorized Propagation Prohibited" or "Unauthorized Seed Multiplication Prohibited," the seed owner acquires protection prior to the issuance of the plant variety protection certificate.[25]

2.3 *Plant patents*

Plant patent protection is the narrowest of the three patent and patent-like IP regimes available to agricultural innovation. The scope of protection extends only to asexually reproduced plant varieties. In general, the U.S. statute grants plant patents to one who

> … *invents or discovers and asexually reproduces any distinct and new variety of plant, including cultivated sports, mutants, hybrids, and newly found seedlings, other than a tuber propagated plant or a plant found in an uncultivated state*…[26]

For example, a person who discovers and asexually reproduces a new pineapple variety may obtain plant patent protection. If he or she later discovers a second variety of pineapple that is separated from the first by a single trait, the second variety may also obtain plant patent protection.

The plant patent regime affords protection against unauthorized asexual reproduction of protected plant varieties. A plant patent grants its holder "*the right to exclude others from asexually reproducing the plant, and from using, offering for sale, or selling the plant so reproduced, or any of its parts*…"[27] To qualify for plant patent protection, a plant must be produced asexually, through means such as grafting, cutting, budding, layering, and inarching.

The cornerstone of plant patent protection is asexual reproduction, but asexual reproduction also severely limits the protection afforded and is therefore its Achilles' heel. The asexual reproduction requirement effectively limits infringement to the narrow circumstance where stock from the patentee's original parent plant is obtained and asexually reproduced. Independent breeding of a variety that closely resembles the subject of a plant patent escapes infringement liability. So too does seed propagation and sexual crosses of the plant, since such acts fall outside the scope of plant patent rights. Because its scope of protection is exceptionally narrow, a plant patent ordinarily should not be the sole source of protection for a plant innovation.

The requirements for obtaining a plant patent are, arguably, the least strict of the three patent and patent-like regimes. In the United States, the Patent and Trademark Office administers both plant patent and utility patents. Like a utility patent application, a plant patent application must meet the patent law's nonobvious requirement. Applications for plant patents must also fulfill a disclosure and claiming requirement. The plant patent disclosure requirement may be met by a description that "*is as complete as reasonably possible*"[28] and a color drawing of the plant. Plant patents need not disclose how to make or use the claimed invention. The claiming requirement restricts the plant patent to a single claim to the whole plant.

Plant patent protection shares some of the requirements for PVPA protection, but there are some differences. Like plant variety protection, a variety must be new and distinct—new, meaning that the plant variety was not sold or used more than one year prior to the application date, and distinct meaning that the characteristics of the variety are clearly distinguishable from those of existing varieties. Unlike plant variety protection, however, plant patents do not require that the plant variety be uniform and stable. Whereas PVPA protection is unavailable for plants that do not breed true, such plants may receive protection under a plant patent.

If the requirements are met, the PTO issues a plant patent, which offers a term of protection of 20 years from the date of patent application. Like a utility patent, there are no exceptions to enforcement. Also like a utility patent, the patent

holder must pay periodic maintenance fees to the PTO.

3. OTHER FORMS OF IP PROTECTION IN PLANTS

3.1 *Trade secrets*

Along with utility patents and plant variety protection, trade secret protection represents another essential tool for protecting plant innovation. Most significantly, trade secret protection is available for inventions that do not otherwise qualify for protection under a patent or patent-like regime.

In general, the purpose of trade secret protection is to uphold commercial morality by preventing the unauthorized use and disclosure of secret information, while leaving other parties free to independently develop the same matter. The subject matter protected by a trade secret coincides with the subject matter protected under patent regimes. Typically, protection attaches to information that is used in business, gives a competitive advantage, and has been kept confidential.

Unlike patents, trade secret protection arises instantly and requires no formal application or review process. Once trade secret protection is established, it grants recourse against one who wrongfully acquires the secret information. To recover for trade secret misappropriation, however, the trade secret owner must show that the information was protected by reasonable measures to ensure the secrecy of the trade secret. The requirement of maintaining the confidentiality of the information is critical: trade secret protection evaporates if the underlying information is no longer a secret. The cost of maintaining a trade secret is therefore largely the cost of maintaining secrecy measures. Keeping a trade secret may involve continuous and costly expenditures on measures to prevent the unauthorized use or disclosure of the information.

Unlike other IP regimes, trade secrets provide protection for an indefinite period rather than for a fixed term of protection. So long as the underlying information continues to be a secret, the information remains protected as a trade secret. Some trade secrets, most notably the secret formula for the beverage Coca-Cola, have been maintained as trade secrets for a very long time indeed. However, trade secret protection can end at any time, since once the underlying information is no longer a secret, the trade secret protection disappears. Loss of trade secret protection may result from disclosure, successful reverse engineering, or independent development by others. Unlike patent protection, trade secret protection provides no recourse against one who reverse engineers or independently discovers the same matter. This uncertainty of protection is the risk borne by one who chooses trade secret protection.

In the context of plant innovation, trade secret protection is a mixed bag. For seed companies, protecting plant varieties under trade secrets alone may prove difficult. Maintaining the secrecy of information is challenging because crops are grown in open fields and seed is sold on the open market with no assurances of confidentiality. Hybrid seed varieties are the easiest to maintain as a trade secrets. Since the exact characteristics of the parental lines of a hybrid cross are difficult for others to ascertain, the owner of the hybrid plant variety may maintain the parental lines as a trade secret and sell only the seed resulting from the cross of the parental lines. Trade secret protection might also be employed to protect know-how, or the methods and techniques of the plant breeder. Additionally, trade secret protection may be used to protect an invention during the patent examination period in order to protect an invention until a patent issues.

Most importantly, trade secret protection is instrumental for protection of innovations that do not otherwise qualify for protection under patent and patent-like protection regimes. Trade secret protection extends to the same subject matter covered by patents and requires only secrecy. Consequently, trade secret protection is vital for protecting matter where patent and patent-like protection is unavailable.

3.2 *Geographic indications, trademark, and copyright protection*

To a much lesser extent than patents (and to some extent trade secrets), the protection provided under geographic indications, trademark, and

copyright may also be used to protect plant innovations. The first of these three, the geographic indications regime, is not traditionally protected under U.S. law, but is recognized under a treaty of the World Trade Organization. Geographic indicators communicate to consumers the association between a product and the territory from which it originates, which may indicate the product's quality, reputation, or other characteristic. The most prominent example of geographic indicators is the designation given to wines, for example *champagne* and *Bordeaux.* Geographic indicators may be used to differentiate among plants originating from different territories.

The second regime, trademarks, focuses on communicating to the consumer the association between a product and the source of the product, such as its manufacturer. This may reflect on the product's quality or authenticity. Trademarks may differentiate one plant breeder's product from another breeder's products, stopping competitors from using the good name a plant breeder has built in its popular varieties. The leading international treaties governing trademark protection include the Paris Convention, the Madrid Agreement, and the Madrid Protocol, all of which are administered by WIPO.

The last of the regimes, copyright, protects works "*fixed in any tangible medium of expression*."[29] Copyright may be used to protect works of authorship such as descriptions of processes, training materials, and brochures, as well as artistic renderings of plant varieties and other ancillary materials. While copyright protects the expression of an idea, the copyright does not protect the underlying idea itself. Anyone is free to use the ideas contained in a copyrighted work. Therefore, while a copyright may protect the written expression that describes a new plant variety, the copyright does not offer protection for the plant variety itself. Internationally, the minimum substantive standards of protection for copyrights are set forth in the Berne Convention, a multinational agreement established in 1886, and in the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS Agreement), an agreement administered by the World Trade Organization.

4. CONCLUSION

In the context of agricultural biotechnology, several IP regimes are available to provide protection for plant innovation. The three most important regimes are utility patents, plant variety protection, and trade secrets. Through careful consideration of the relative demands and benefits of each regime in terms of the protection it offers for different types of plant innovation, individual approaches may be custom-tailored to suit the needs of the inventor and the nature of the invention. ■

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1 35 U.S.C. § 101

2 35 U.S.C. § 271(a)

3 35 U.S.C. §§ 102–103

4 35 U.S.C. § 102

5 35 U.S.C. § 101

6 35 U.S.C. § 112

7 35 U.S.C. § 112

8 35 U.S.C. §§ 102–103

9 See also in this *Handbook*, chapter 10.7 by AM Schneiderman.

10 The acronym UPOV originates from the French name for the organization, Union internationale pour la Protection des Obtentions Végétales.

11 "International Convention for the Protection of New Varieties of Plants," art. 14, 19 March 1991, available at www.upov.int/en/publications/conventions/1991/w_up911_.htm.

12 See note 11.

13 UPOV, "International Union for the Protection of New Varieties of Plants: What It Is, What It Does," www.upov.int/en/about/pdf/pub437.pdf.

14 7 U.S.C. § 2402(a)

15 7 U.S.C. § 2401(a)(3)

16 7 U.S.C. § 2541(e)

17 7 U.S.C. § 2543

18 7 U.S.C. § 2544

19 7 U.S.C. § 2402(a)(1)

20 7 U.S.C. § 2402(a)(2)

21 7 U.S.C. § 2401(b)(5)

22 7 U.S.C. § 2402(a)(3)

23 7 U.S.C. § 2402(a)(4)

24 7 U.S.C. § 2483(b)
25 7 U.S.C. § 2567
26 35 U.S.C. § 161
27 35 U.S.C. § 163
28 35 U.S.C. § 162
29 17 U.S.C. § 102(a)