INTELLECTUAL PROPERTY RIGHTS IN AGRICULTURAL DEVELOPMENTS: HISTORY AND PROGNOSIS[1]

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Through the ages, innovations in agriculture have gated the march of human civilization. There is no small irony, then, in the controversy that abides between agriculture and the intellectual property (IP) laws that were erected to foster invention.

The most prominent component of the IP edifice, the international patent system, had its beginnings in the *litterae patentes* ("open letters") by which monarchs in medieval Europe granted an exclusive privilege, for a prescribed period, to encourage the recipient's development of raw land or a strategic commodity, such as a mining resource. In a similar vein, the Venitian city state of the 1200's granted a 10-year monopoly to innovators in the manufacture of silk.

By the 15th century, this expedient of economic policy had evolved, not only in Venice but also in England and elsewhere in Europe, into laws that granted an inventor the right to exclude others, for a time, from practicing his invention. Although the "first law providing for the grant of exclusive rights...to the makers of inventions...seems to have been in Venice in 1474,"[2] an English glazier earlier received the first recorded patent of invention, in 1449:

> ...he was awarded a 20-year monopoly for a glass-making process previously unknown in England .... In return for his monopoly, John of Utynam was required to teach his process to native Englishmen.[3]

From these beginnings, one can discern the basic outline of the modern patent: the grant to an inventor, by a national government, of a temporary property right in an invention (*i.e.*, a right to prevent its unauthorized use), in return for the inventor's ensuring public access to the invention after the right terminates. It also is apparent why patent rights in Europe were associated with the power of the sovereign, delegated, as it were, to the interests of commerce. With some justification, those interests were deemed indifferent if not hostile to those of the small farmers who predominated in the rural economy. This perspective was readily

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[2] *A Brief History of the Patent Law of the United States* (Ladas & Parry), at http://www.ladas.com/Patents/USPatentHistory.html (last visited October 25, 2003).

[3] *The History of Patents* (Thomson Derwent), at http://thomsonderwent.com/patinf/patentfaqs/history (last visiting October 22, 2003).

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generalized, moreover, to the lawyers who administered the patent system and the academic theoreticians whose writings illuminated it.[4]

For their part, the latter groups came to view patent rights as the exclusive province of "industrial" law, informed by modern science and quite distinct from agricultural endeavors. In turn, lawyers and law professors translated their biases into the bulwark of contemporaneous European patent laws. Thus, those laws as a rule made "industrial applicability" a patentability prerequisite, and they generally omitted mention of or even prohibited the patenting of plant and animal varieties.

This is not to say that the European patent establishment was disinterested in agricultural matters. As early as 1883, a key international treaty on IP law defined the field of protectible subject matter to include "not only the products of industry in the strict sense but also agricultural products (wines, grain, fruit, cattle, etc.)."[5] This notion was voiced, in subsequent conventions, throughout the initial decades of the last century.[6]

Especially after World War II, moreover, patent practitioners in different European countries experimented with patent claims directed to agricultural inventions, including plant varieties.[7] Those individuals struggled, however, against the tide of opinion within their own profession, which viewed the fruits of agricultural innovation as lacking "technical" character and resisting "reproducible" description, in contrast to "industrial" inventions.[8]

Those who sought plant-varietal protection via patenting had to contend as well with a deep-seated social antipathy toward the consolidation of commercial interest in food production. In this context the "monopoly" stigma, attaching to patents in previous generations, found new

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[4] This tenor of opinion is illustrated by one European commentator's sarcastic observation that the "lawyers have conducted themselves in this field [of plant-related patents] like tailors [who are] anxious to make a suit for their client and who, in their haste to advise him as to the cut and material, have failed to take the trouble to find out whether this cut and material were appropriate to the measurements and physical conformation of their client, being persuaded that these were standard." Laclaviere, "The Convention of Paris of December 2, 1961, for the Protection of New Varieties of Plants...," *Industrial Property*, No. 10 (Oct. 1965), at 225.

[5] CONVENTION OF PARIS FOR THE PROTECTION OF INDUSTRIAL PROPERTY, March 20, 1883.

[6] Bent, S.A., *et al.*, INTELLECTUAL PROPERTY RIGHTS IN BIOTECHNOLOGY WORLDWIDE (Stockton Press, 1987), pages 40 & 41 [hereafter, "Bent *et al.* (1987)"].

[7] *See* Wuesthoff, "Patenting of Plants," *Industrial Property Quart.* (No. 2), at 12 (Jan. 1957). These pioneering efforts met with varying degrees of resistance or acceptance. *See* Bent *et al.* (1987), in Chapter 3 at notes 5-7 and related text (patent coverage of plant varieties deemed acceptable in Germany, Spain, and Italy before 1950; prohibited in Great Britain, by case law, and in Denmark by statute). *See also* Dort, "A Questionable Novum," 1 *Euphytica* 80 (1952) (criticizing grant of protection, in West German Patentschrift No. 829,076, to method for producing triploid sugar-beet seed).

[8] For a later enunciation of this viewpoint, see Decision of October 16, 1973, German Federal Supreme Court, 1975 *GRUR* 654 ("African Violet") (rejection upheld of patent application, directed to vegetative propagation of new ornamental variety, for lack of a "copyable teaching" of claimed process).

expression in hyperbole that envisioned, for instance, "a rural...population reduced to begging" by plant patents.[9]

In the United States, the parallel legal evolution proceeded along rather different lines. Reflecting, perhaps, the expansive mindset of a new nation, the U.S. patent law evolved without emphasis on "industrial applicability" or on express exclusions of "non-statutory" subject matter, such as a plant varieties. As later U.S. case law put it, anything that was "new under the sun" was patentable in principle, so long as the claimed subject matter, meeting other substantive requirements,[10] also embodied "the hand of man" (human intervention) and, hence, was not a "product of nature."[11]

Thus conditioned, the U.S. environment sustained a debate over plant-varietal protection that resonated with its European counterpart on certain issues, including the legal question of "reproducible" description and the policy concern over patenting food crops. [12] Sociopolitical considerations of a decidedly endemic nature prompted an outcome that departed significantly from what transpired in Europe, however.

Initially, the U.S. Congress responded to entreaties by the plant nursery industry, with its focus on ornamental and fruit varieties, by passing the Plant Patent Act of 1930 ("PPA"). In keeping with the concerns of nurserymen over unauthorized asexual propagation of cuttings, the PPA ceded an exclusive right to one who "has invented or discovered and asexually reproduced any distinct and new variety of plant, other than a tuber-propagated plant."[13] A relaxed disclosure requirement[14] was offset by coverage limited to the very plant, so described. Thus,

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[9] Bent *et al.* (1987), in Chapter 3 at note 21 and related text (quoting West German agricultural minister, *circa* 1954).

[10] By 1952 the U.S. Patent Statute required that an allowable patent claim (A) cover subject matter that was both "novel" and "non-obvious" and (B) find adequate support in an accompanying commentary, or "specification," which included a "written description" of the claimed invention and which "enabled" its routine practice. 35 U.S.C. §§ 102, 103 & 112 (1952). The 1952 statute also mandated that a claimed invention be "useful," in the sense that is have practical utility.

[11] *Diamond v. Chakrabarty*, 447 U.S. 303, 308-09 (1980). The concept of an unpatentable "product of nature" appears, possibly for the first time, in *Ex parte Latimer*, 1889 *Official Gazette Pat. Office* 1638-39, a decision by the U.S. Commission of Patents to deny a claim to fiber derived from pine tree needles, on grounds that claimed material did not differ from product in its natural state.

[12] *See* Fowler, "The Plant Patent Act of 1930: A Sociological History of Its Creation," 82 *J. Pat. & Trademark Off. Soc'y* 621 (2000).

[13] Townsend-Parnell Plant Patent Act of 23 May 1930, Pub. L. No. 245 (71st Congress), *codified at* 35 U.S.C. §§ 161-164 (1999). See Fowler (2000), *supra,* for a more detailed discussion of the political compromise that yielded the PPA. *See also* Janis & Kesan, "Weed-Free I.P.: The Supreme Court, Intellectual Property Interfaces, and the Problem of Plants" 23, 24 (2001), from the Social Science Research network Electronic Paper Collection, http://papers.ssrn.com/abstract=290634.

[14] "No plant patent shall be declared invalid for noncompliance" for descriptive insufficiency "if the [patent] description is as complete as is reasonably possible." 35 U.S.C. § 162 (1952).

protection under the PPA was a safeguard only against theft and asexual propagation of "distinct" plant material.[15]

By contrast, increasingly heated arguments in Europe over whether or how to achieve varietal protection had effectively derailed the patenting experiments of the post-WWII era. Energized by a perceived apathy on the part of the patent-legal mainstream, apologists for a non-patent form of protection successfully lobbied national governments for the creation of a new treaty organization, the International Union for the Protection of New Varieties of Plants, known by its French acronym, UPOV.[16]

Analogizing from earlier agricultural-regulatory laws, which had established national varietal registries,[17] the 1961 UPOV Convention put forward an exclusive grant that was limited to a particular variety, memorialized by a germplasm deposit and defined by *distinctive* varietal characteristics, *uniformity*, and *stability* (DUS). The 1961 text also exempted uses by others of a protected variety "as an initial source of variation for creating other new varieties."

These elements of the 1961 UPOV treaty, including the exemption for breeders' experimentation, became hallmarks both of later UPOV texts and of the implementing laws of the signatory countries, eventually including the United States. Against the backdrop of European developments in *sui generis* varietal protection, the U.S. Congress legislated the U.S. Plant Variety Protection Act of 1970 ("PVPA"),[18] ostensibly to encourage the development of sexually propagated crop varieties.[19] The substantive provisions of the PVPA were essentially consistent with the UPOV program of (A) varietal registration, based on a DUS description,[20] and (B) the prohibition of unauthorized germplasm propagation or dissemination,[21] subject to exemptions related, respectively, to farmer-saved seed[22] and "bona fide research."[23] Especially

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[15] *See Imazio Nursery, Inc. v. Dania Greenhouses*, 69 F.3d 1560 (Fed. Cir. 1995) (showing of genetic similarity between protected and accused plants held insufficient evidence of taking of shoots from protected plant, a prerequisite for plant-patent infringement).

[16] The key players in this drama were the International Association for the Protection of Industrial Property (French acronym: AIPPI), on the IP side, and the International Association of Plant Breeders for the Protection of Plant Varieties (French acronym: ASSINSEL). For more on the interplay between the patent and the anti-patent interests of the day, see Bent *et al.* (1987), Chapter 3 at pages 47-62.

[17] *See* Janis and Kesan, "U.S. Plant Variety Protection: Sound and Fury...?" 39 *Houston Law Rev.* 727, 739-41 (2002).

[18] 7 U.S.C. §§ 2321 *et seq.* (2000).

[19] *See* Janis and Kesan (2002), *supra*, at note 73 and related text.

[20] 7 U.S.C. § 2402 (1996).

[21] 7 U.S.C. § 2541 (1994)

[22] 7 U.S.C. § 2543 (1994) ("it shall not infringe...for a person to save seed" of a protected variety "and [to] use such saved seed in the production of a crop for use on the farm of the person, or for...bona fide sale for other than reproductive purposes"). Compare *Monsanto Co. v. McFarling*, 302 F.3d 1291 (Fed. Cir. 2002) (preliminary injunction, for patent infringement, affirmed against farmer-licensee who admitted violating "Technology

given the enticement of reciprocity between UPOV signatories, therefore, it was no great stretch on the U.S. side to accommodate becoming a party to UPOV in 1981.[24]

By the 1980's and the advent of the Biotechnology Revolution, the relevant provisions of the U.S. Patent Statute, the PPA, and the PVPA delineated a tripartite system of plant-applicable IP rights, the segments of which system were deemed mutually compatible at law.[25] Again, the contrast with Europe is striking. Although the 1961 UPOV convention had been permissive on the issue of national choice between patent and plant-varietal protection schemes,[26] the political atmosphere in Europe, poisoned by decades of controversy over the patenting of plants, finally could sustain only the UPOV approach, which became mandatory for plant-related IP rights.[27] Thus, when the European Patent Convention (EPC) came into force in 1978, its Article 53(b) excluded both plant and animal "varieties" from the category of patentable subject matter.

In its 1991 convention, UPOV turned away from a strict exclusivity between patenting and plant-variety protection.[28] This shift left EPC Article 53(b) unchanged, however, resulting in a *de facto* moratorium, for most of the 1990's, on the examination of plant-related patent

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Agreement" that forbade his "sav[ing] any crop produced from [licensed, herbicide-resistant] seed for replanting, or supply[ing] saved seeds to anyone for replanting").

[23] 7 U.S.C. § 2544 (1970).

[24] *See* Janis and Kesan (2002), *supra*, at notes 88 & 89 and related text.

[25] *See Ex parte Hibberd*, 227 U.S.P.Q. 443, 446 (PTO Bd. Pat. App. & Int. 1985) (patent office appeals board reverses rejection of claims to high-tryptophan "maize seed" and "maize plant," *inter alia*, discounting examiner's allegation of conflict between U.S. Patent Statute, PPA and PVPA), *citing Diamond v. Chakrabarty*, 447 U.S. 303, 311-314 (1980) (PPA and PVPA reflect no Congressional intent to exclude living-matter inventions from utility-patent protection). The U.S. Supreme Court confirmed this reasoning in *J.E.M. Ag Supply v. Pioneer Hi-Bred Int'l, Inc.*, 534 U.S. 124 (2001), by holding that plants are eligible for protection under that U.S. Patent Statute, which, the Court stated, "can be read alongside" the PPA and PVPA "in protecting plants."

[26] "Article 2(1) of the 1961 UPOV convention permitted each member state the option of recognizing the rights of the breeder...'by the grant either of a special title of protection or of a patent,' but required that a member state provide only one of these forms for one and the same botanical genus or species." Bent *et al.* (1987), at 63. *See also* Heitz, "The History of the UPOV Convention and the Rationale for Plant Breeders' Rights," *in* 1991 SEMINAR ON THE NATURE AND RATIONALE FOR THE PROTECTION OF PLANT VARIETIES UNDER THE UPOV CONVENTION 25 (UPOV 1994).

[27] *See* Janis and Kesan (2002), *supra*, at note 69 and related text.

[28] "Unlike the first sentence of Article 2(1) of the 1978 Act, the 1991 Act is silent on the form of the breeder's right. It may take the form of a special *sui generis* breeder's right, or it may be called a 'patent'...so long as it has the minimum substance provide for in the Convention. The 1991 Act equally contains no provision corresponding to the second sentence of Article 2(1) of the 1978 Act (the so-called 'ban on double protection') so that a Contracting Party is...free to protect varieties, in addition to the grant of a breeder's right, by the grant of other titles, particularly patents." Greengrass, "The 1991 Act of the UPOV Convention," 13 *Eur. Intell. Prop. Rev.* 466, 467 (1991).

applications at the European Patent Office in Munich. That moratorium lifted only recently.[29] There still is considerable uncertainty over the practical availability of patent protection for agricultural innovations across Europe.[30]

In the meantime, the UPOV model for plant variety protection has become the approach of choice among countries set on revising their laws to comply with the TRIPS Agreement of the GATT.[31] Thus, the trend in plant intellectual property is toward a worldwide division between (i) "objective" IP systems, which hearken to the registration laws of mid-20th century Europe and which focus on actual, individual varieties, and (ii) "prospective" systems, which offer patent or patent-like coverage for future as well as present embodiments of a well-described invention.

As discussed above, the different system types emerged and diverged due to the ***perceived*** needs of specific interest groups. Those perceptions, in turn, informed and continue to inform policy decisions that are implemented with little or no empirical basis:

> ...the overall changes in intellectual property protection appear to have stimulated greater private sector investment in plant breeding, but the quantitative impact has been extremely hard to determine....To the best of our knowledge, no studies have analyzed the influence of utility patenting on plant breeding.[32]

Accordingly,

> ...the empirical record concerning the economic effects of intellectual property protection...in agriculture is inconclusive. At the retail level for corn and soybean seed, foundation seed companies generally have access to herbicide-tolerant and Bt technologies through licensing....At the more fundamental

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[29] *See* Decision of the EPO Enlarged Board of Appeal G1/98 ("Novartis"), *Official Journal of the European Patent Office* 111 (2000) (Article 53(b) does not apply to patent claim that embraces plant varieties generically but not specific plant varieties *per se*).

[30] There was the promise of some uniformity to European law with the entry into force, in 1998, of Directive 98/44/EC of the European Parliament and the Council on the Legal Protection of Biotechnological Inventions. Article 1(a) of this biotechnology directive excludes plant and animal varieties from patentable subject matter, but Article 4 states that "inventions, which concern plants or animals, shall be patentable if the technical feasibility of the invention is not confined to a particular plant or animal variety." 1999 *Official Journal of the European Patent Office* 101, 111 & 113. Yet, while the rules of the European Patent Office now incorporate these principles, fewer than half of the European Union member states have implemented the biotechnology directive, which is embroiled in contention over the commercialization of genetically modified organisms. *See* Fleck and Baldock, "Intellectual Property Protection for Plant-Related Inventions in Europe," 4 *Nature Reviews Genetics* 834 (2003).

[31] *See, e.g.*, Janis and Kesan (2002), *supra*, at note 70 and related text.

[32] Heisey *et al.*, "Public Sector Plant Breeding in a Privatizing World," *Agriculture Information Bulletin* 772, USDA Economic Research Service (2001), http://www.ers.usda.gov.publications/aib772/, at page 5 (citations omitted).

research level, however, whether the current intellectual property regime is stimulating or hampering research is unclear.[33]

Nevertheless, practical experience and some evidence indicate that, beyond incentivizing private investment in plant breeding, intellectual property rights in general and patent rights in particular "function primarily as a facilitator mechanism that reduces transaction costs of negotiating and sustaining interfirm R&D alliances," so prevalent in agbiotech endeavors.[34] That this "mechanism" should find its appropriate expression in different parts of the world, each affected to a varying degree by factors such as the mix of public-sector/private-sector involvement[35] and the ability to absorb or to generate new technology,[36] favors maintaining maximum flexibility in available intellectual-property vehicles for agricultural innovation.

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[33] "Economic Issues in Agricultural Biotechnology" (R. Shoemaker, ed.), *Agriculture Information Bulletin* 762, USDA Economic Research Service (2001), http://www.ers.usda.gov.publications/aib762/, at page 37 (citations omitted).

[34] Paraphrasing Barnett, "Cultivating the Genetic Commons: Imperfect Patent Protection and the Network Model of Innovation," 37 *San Diego L. Rev.* 987, 1001 (2000). As to the impact of the plant variety right (PVR) in this regard, one report "suggest[s] that PVR enactment [in Spain] had a positive incentive, especially for private breeders, who increased their market share" as a consequence and who, with "the possession of legal rights by the original inventor," were better able to "hand[] off the task to an organization better situated for development and commercialization." Diez, "The Impact of Plant Varieties Rights on Research: The Case of Spain," 27 *Food Policy* 171, 182 & 182 (2002). *But see* Alston & Venner, "The Effects of the US Plant Variety Protection Act on Wheat Genetic Improvement," 31 *Research Policy* 527, 541 (2002) (regression-modeling results "consistently indicate that the PVPA has not contributed to increases in commercial or experimental yields of wheat).

[35] An empirical study of "U.S. patent data on biological inventions with relevance for crop agriculture" revealed "a world of agricultural R&D in which public sector researchers do the most original biotechnology work, and do it perhaps earlier. Entrepreneurs make their entry in the private sector if they have a high value technology that promises to be highly appropriable, and they build upon it. Corporations do the most innovating, in terms of generating sheer numbers of patents of moderate appropriability and lower in value." Graff, "The Sources of Biological Innovation in Agriculture: Comparative Advantages of Public, Entrepreneurial, and Corporate R&D," paper presented at the AAEA NC208 Conference on *R&D Policies and Impacts*, March 30/31, 2001 (University of California-Berkeley), at pages 1 and 47. Again, this diversity of roles should be matched by a diversity of choices for IP rights.

[36] "Undue concern about freedom to...conduct research by or on behalf of developing countries is misdirecting policy and practical attention away from the main constraints currently facing researchers on food crops for [developing countries]. The real constraints are an increasingly serious lack of investment in developing-country research and a lack of local scientific skills to access...modern biotechnologies, whether they are protected by patents or not." Pardey *et al.*, "Intellectual Property and Developing Countries: Freedom to Operate in Agricultural Biotechnology," Brief 3, at page 5, *in* BIOTECHNOLOGY AND GENETIC RESOURCE POLICIES, January 2003 (P.G. Pardey and Bonwoo Koo, eds.), International Food Policy Research Institute, Washington, D.C.