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Patent and Trademark Office (USPTO)

Patent law is important to the agricultural sector, which owes a large part of its productivity growth to the introduction of new technologies that might not have been created in the absence of patent protection. While patent laws are passed by Congress, it is the U.S. Patent and Trade Office (USPTO) in the Department of Commerce that is charged with administering the law–its primary task being the review of patent applications and issuance of patents. The US Court of Appeals for the Federal Circuit, which has nationwide jurisdiction over cases involving patent law, also plays a significant role in shaping how the patent law is interpreted as does the Antitrust Division of the Department of Justice (AT-DOJ), often called on to investigate questions of patent misuse and infringements.

This section of the overview explains what a patent is, reviews benchmark patent laws and legal decisions affecting agriculture, identifies agricultural policy issues associated with patent law, and recommends materials for further reading.

What Is a Patent?

A *patent* grants rights to inventors allowing them to benefit from their creations for a specified period of time (usually not to exceed 20 years) during which others cannot produce or market the patented product without a license from the patent owner and, generally, the payment of royalties. The logic behind patent law is that it encourages creativity and technological development by ensuring that inventors can recoup research and development costs. However, a patent does grant monopoly rights to the patent owner, creating tension between the goals of stimulating invention and promoting economic competition. Consequently, patent law and antitrust enforcement are intimately intertwined.

Patent Law: Origins and Agricultural Benchmarks

The U.S. has a long history of patent protection dating back to Art 1, Sec. 8 of the Constitution, which stated that "The Congress shall have Power ... To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries".

Key benchmarks in the evolution of patent protections applied to agriculture are summarized below and include legislation enacted by Congress as well as court decisions.

Event	Description
1793 Patent Act	Established the scope of patentable innovations that is applied to the issuance of *utility patents*. The Act states: "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…."
1930 Plant Patent Act (PPA)	Passed because the utility patent was deemed inappropriate for living organisms. Plant patents, however, were restricted to asexually reproduced plants.
1954 Amendment to PPA	Plant Patent Act amended to include seeds, mutants, and hybrids.
1970 Plant Variety Protection Act Amended 1994	Created a USDA-issued "patent-like" certificate to developers for sexually reproduced plants (USPTO has no jurisdiction here). Act does not restrict farmers' rights to save plant seed or researchers' rights to use the seed but does prohibit farmers from cleaning and selling seed for 20 years from the certificate date.
1980 Bayh-Dole Act	Bayh-Dole permits a university, small business, or non-profit institution to pursue ownership of an invention they developed using federal research funding. Before the Act, inventions developed with federal funding were owned by the government. The intent of the Act was to speed up the development of practical applications of inventions created using federal funding.
1980 *Diamond v. Chakrabarty*	Supreme Court granted a utility patent for genetically engineered bacteria opening the way for other living organisms to receive the more rigorous protection associated with utility patents.
2001 *J.E.M. Ag Supply v. Pioneer*	Supreme Court further strengthened utility patent rights for seeds, prompting a rapid increase in seed utility patent applications.
2013 *Association for Molecular Pathology v. Myriad Genetics.*	This Supreme Court decision upheld the rule that natural phenomena cannot be patented. For example, a human gene that is isolated by a researcher but not changed in any way from its "natural character" cannot be patented.

Another benchmark will be reached in 2014 when Monsanto's patent 247 on its first Round-up Ready (RR) Soybean will expire, permitting farmers to save seed and replant some of the RR soybean varieties in 2015. The expiration of this patent opens the door to generic versions of the seed and could result in much more extensive and unsupervised use of the GE seed than during the patent period. Whether a particular RR soybean variety can be saved and planted is not, however, an easy question to answer as any given variety may be subject to multiple patents from multiple firms and it is only the original Monsanto patent that is expiring.[1]

Agricultural Policy Patent Issues

Patenting and industry concentration. In recognition of the public's perception that patent ownership may contribute to monopoly power, the Department of Justice and the Federal Trade Commission (responsible for antitrust enforcement) issued Antitrust Guidelines for Intellectual Property in 1995.[2] There have been numerous lawsuits filed by agricultural firms claiming

violations of their patent rights[3] and some recent investigative efforts conducted by the AT-DOJ in the agricultural sector.[4] In 2010, USDA and AT-DOJ conducted a series of workshops across the US to collect information from various stakeholders on their perceptions of competition in agriculture; patent issues were frequently raised by participants.[5]

Although precise data is not available on seed market shares, best estimates are that for the U.S. soybean and corn markets Monsanto and DuPont each represent roughly a third of seed sales, with the next largest firm, Syngenta, selling roughly 10%. Although these numbers suggest market concentration, they do not approach the level of concentration needed to justify antitrust actions (see antitrust section for details).

Through licensing arrangements with competing firms, however, Monsanto owns patents on genetic traits in seeds that were planted on 95% of U.S. soybean acreage, 81% of corn acreage, and 79% percent of the GM cotton acreage (2009 numbers).[6] Firms owning patents on particular seeds or genetic traits are allowed to place restrictions on the use of their products by licensees. Common restrictions imposed often exclude independent research on productivity claims. This type of restriction has been criticized by agricultural extension researchers at land grant universities as it prevents them from fulfilling their traditional role in testing and adapting new varieties to local conditions. Another area of research that is often not open to licensees is testing for health and environmental impacts.[7]

Impact of the Bayh-Dole Act. There has been much speculation but little empirical research on the Bayh-Dole Act's impact on speeding up technology transfer, particularly in the agricultural sector. Although the 1980 combination of Bayh-Dole and the *Diamon v. Chakrabarty* decision was followed by an increase in patents awarded, the increasing trend in these types of patents was already evident before 1980 making it difficult to isolate the role of either factor. Some analysts argue that a "non-trivial fraction of the things universities are now licensing would previously have been put into the public domain"[8] and available without licensing fees. Others offer cautionary advice about the underlying assumption of the Bayh-Dole that patenting innovations offers more promise for rapid dissemination of new technologies than the more traditional approach to publicly funded research that made the information available to all without complex licensing procedures. It is also difficult to separate the impact of Bayh-Dole from the impact of declining federal funds for agricultural research, which may have put pressure on scientists at public institutions to pursue patents in order to supplement research funding with royalties from patented inventions.[9]

Recommended Readings

Moschini, GianCarlo. 2010. Competition Issues in the Seed Industry and the Role of Intellectual Property, Choices 25(2). http://www.choicesmagazine.org/magazine/pdf/article_120.pdf.

> This article is a bit long (13 double-spaced pages) but it is an excellent, impartial review of the tension between patent law and antitrust concerns in the seed industry.

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Several of the articles cited in the patent discussion above are also excellent sources of information for those interested in more details on this topic (e.g., the Joe Miller blogs and the articles by Philpott or Pollack).

[1] See Monsanto's discussion of this issue at http://www.monsanto.com/newsviews/pages/roundup-ready-patent-expiration.aspx, accessed 10/23/13.

[2] U.S. Department of Justice and Federal Trade Commission, 1995, Antitrust Guidelines for the Licensing of Intellectual Property, http://www.justice.gov/atr/public/guidelines/0558.htm, accessed 10/23/13.

[3] See, for example, "Monsanto sets the record straight on DuPont's Submission". http://www.monsanto.com/Documents/the-real-facts-on-dupont-submission.pdf, accessed 11/15/13. This is Monsanto's rebuttal of DuPont's charges of non-competitive practices in the seed industry. While it is clearly only one side of the picture, it illustrates the types of issues that are being raised in court cases where seed sector firms are battling each other over patent rights and infringements.

[4] See, for example, Tom Philpott, Dec. 1, 2012, "DOJ Mysteriously Quits Monsanto Antitrust Investigation," Mother Jones, http://www.motherjones.com/tom-philpott/2012/11/dojs-monsantoseed-industry-investigation-ends-thud, accessed 10/23/13. This article discusses the DOJ antitrust investigation into Monsanto's seed sector activities. The investigation was announced in 2010 and closed in 2012, without any published result. The article synthesizes the arguments of Monsanto critics concerning inappropriate uses of patents and other means of restricting competition and raises questions about why the DOJ ended the investigation.

[5] Department of Justice and United States Department of Agriculture, May 2012, "Competition and Agriculture: Voices from Workshops on Agriculture and Antitrust enforcement in our 21st Century Economy and Thoughts on the Way Forward," http://www.justice.gov/atr/public/reports/283291.pdf, accessed 10/23/13.

[6] Numbers from Moschini (2010) using Monsanto official statistics and USDA area data.

[7] Andrew Pollack, "Crop Scientists Say Biotechnology Seed Companies Are Thwarting Research," New York Times, February 19, 2009, http://www.nytimes.com/2009/02/20/business/20crop.html?_r=0, accessed 11/15/13.

[8] Richard Nelson, "Technology transfer, in theory and practice," 21st Century Issues Series, Issue 3. http://www.columbia.edu/cu/21stC/issue-3.1/nelson.html, accessed 11/15/13. The entire issue is a series of articles on intellectual property issues and university research.

[9] Points in the paragraph are drawn from David C. Mowery, Richard R. Nelson, Bhaven N. Sampat, and Arvids A. Ziedonis, The Effects of the Bayh-Dole Act on U.S. University Research and Technology Transfer: An Analysis of Data from Columbia University, the University of California, and Stanford University, revised version of a paper presented at the conference on "The U.S. and Japanese Research Systems," Kennedy School of Government. Harvard University, September 10-12, 1998, http://www.ipeg.eu/wp-content/uploads/MOWERY-NELSON-et-al-1998-The-effects-of-the-Bayh-Dole-Act-on-US-University-Research-and-Technology-transfer-an-analysis-of-data.pdf, accessed 11/15/13. IPEG is the Intellectual Property Expert Group, an Intellectual Property consulting firm.

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