

WHAT IF SEEDS WERE NOT PATENTABLE?

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TABLE OF CONTENTS

ABSTRACT	322
INTRODUCTION	322
I. PROTECTION OF SEED UNDER PUBLIC LAW.....	323
A. Plant Patent Act	323
B. Plant Variety Protection Act.....	324
C. Utility Patent Protection for Plants	326
II. PROTECTION OF SEED UNDER PRIVATE LAW	327
III. PROTECTION OF THE DEVELOPMENT PROCESS.....	328
IV. CHANGING THE LANDSCAPE.....	329
V. PROTECTING THE RELATIONSHIP BETWEEN DEVELOPERS AND DISTRIBUTORS	331
VI. PROTECTING THE RELATIONSHIP BETWEEN DEVELOPERS AND FARMERS.....	332
VII. A COMPARISON OF THE VARIOUS FORMS OF PROTECTION	333
A. Scenario One: Farmer Saves Lawfully Acquired Seed	334
1. <i>Plant Variety Protection Act</i>	334
2. <i>Contractual Protection</i>	334
3. <i>Utility Patent Protection</i>	334
4. <i>Conclusion</i>	335
B. Scenario Two: Farmer Saves Seed	335
1. <i>Plant Variety Protection Act</i>	335
2. <i>Contractual Protection</i>	335
3. <i>Utility Patent Protection</i>	336
4. <i>Conclusion</i>	336
C. Scenario Three: Ginner Cleans Protected Seed.....	337
1. <i>Plant Variety Protection Act</i>	337
2. <i>Contractual Protection</i>	337

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3. <i>Utility Patent Protection</i>	338
4. <i>Conclusion</i>	339
D. Scenario Four.....	340
1. <i>Plant Variety Protection Act</i>	340
2. <i>Contractual Protection</i>	340
3. <i>Utility Patent Protection</i>	340
4. <i>Conclusion</i>	340
VIII. ENFORCING PRIVATE ORDERING AND ANTITRUST RESTRICTIONS ..	341
CONCLUSION	343

ABSTRACT

In 2001, the United States Supreme Court held that seeds were patentable subject matter—a decision, I assert, of much discussion and little impact.¹ Protection of agricultural intellectual property through private ordering, used both to expand the protection available through public ordering and to circumvent the restrictions public ordering places on owners of intellectual property, has provided the incentives necessary to promote investment and innovation in seeds. It has not been the patentability of seeds that has led to agricultural advances, but rather the profitability of licensing agricultural intellectual property. What if seeds were not patentable? So what if they are. Innovation in seed has been neither promoted nor incentivized by the extension of patent protection, but rather by private ordering and free markets.

INTRODUCTION

Arguably, no country in the world has as expansive a protection scheme for agricultural biotechnology as the United States.² Under the public ordering system, an agricultural innovator can apply for a Plant Variety Protection certificate from the Department of Agriculture, a Plant Patent from the United States Patent and Trademark Office (Patent Office) and a utility patent also from the Patent Office. Each of these forms of protection has its strengths and weaknesses. Private ordering allows the agricultural innovator to overcome these limitations.

1. *J.E.M. Ag Supply Inc. v. Pioneer Hi-Bred Int'l, Inc.*, 534 U.S. 124, 127 (2001) (“We hold that utility patents may be issued for plants.”).

2. Edmund J. Sease & Robert A. Hodgson, *Plants are Properly Patentable Under Prevailing U.S. Law and This is Good Public Policy*, 11 *DRAKE J. AGRIC. L.* 327, 329 (2006) (“As far as we are aware, no other country offers as expansive protection for plants as the United States.”).

Agricultural innovation has proven profitable, and protection of this economic interest has found its basis in private ordering—revolutionizing the way seed is distributed. No longer is seed sold. Instead, seed is licensed and protected through an extensive private ordering system that does not rely on the Patent Act. Agricultural innovators, be they patentees or not, may choose to not license their goods—but they may not choose to do so in an anticompetitive manner. The protection of a patent is not sufficient to protect agricultural innovators if their behavior deprives the farmers of their right to a free market.

Private ordering has allowed agricultural innovators to control the market, to affect seed prices, and to develop new varieties, without having to patent their seed. When the United States Supreme Court decided in *J.E.M. Ag Supply Inc. v. Pioneer Hi-Bred International, Inc.* in 2001 that seeds were patentable subject matter,³ its decision was one of much fanfare and little impact.⁴ The revolution in agricultural innovation was impacted by the patentability of seed, but had already occurred at the initiative of the innovators themselves and through their novel use of private ordering.

I. PROTECTION OF SEED UNDER PUBLIC LAW

Agricultural intellectual property has long been the subject of an expansive protection scheme in the United States.⁵ Recognizing the importance of innovation and the role that public ordering plays, Congress has passed a variety of protective measures for plants, each conflicted, controversial, and limited in scope. A brief history of public protection of plants illustrates this point.

A. Plant Patent Act

In 1930, Congress enacted the Plant Patent Act (PPA) that protected “asexually reproducing plants.”⁶ Sexually reproducing plants, such as those grown from seed,⁷ were not protected by the PPA.⁸ This is the fundamental

3. 534 U.S. at 142.

4. See, e.g., Steve Raabe, *Farmers Fear Cost of Ruling: Court Restricts the Saving of Patented Seeds*, DENVER POST, Dec. 14, 2001, at C1; *Seed Companies Given Protection for Patents/Farmers Expect Ruling to Raise Planting Costs*, HOUSTON CHRON., Dec. 11, 2001, at 2; Michael T. Roberts, *National AgLaw Center Research Article, J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred International, Inc.: Its Meaning and Significance for the Agricultural Community*, 28 S. ILL. U. L.J. 91, 128 (2003).

5. Sease & Hodgson, *supra* note 2, at 329.

6. “Asexual reproduction occurs by grafting, budding, or the like, and produces an offspring with a genetic combination identical to that of the single parent—essentially a clone.” *J.E.M. Ag Supply Inc.*, 534 U.S. at 132.

7. “Sexual reproduction includes any production of a variety by seed but does not include the production of a variety by tuber propagation.” Jorge Fernandez-Cornejo, USDA,

weakness of the PPA, since “[c]opying’ . . . is the definition of agriculture.”⁹ When the primary purpose of a sexually reproducing plant is to self-reproduce, it is difficult to justify the expense of innovation. Even absent statutory protection, an asexually reproducing plant does not self-replicate, thus generating an innate form of protection and incentive for innovation.¹⁰

B. Plant Variety Protection Act

Subsequently in 1970, Congress enacted the Plant Variety Protection Act (PVPA). The PVPA provides limited protection for sexually reproduced plants through Certificates of Protection (PVP certificates).¹¹ PVP certificates are issued by the U.S. Department of Agriculture, not by the Patent Office. To protect a plant variety under the PVPA, the plant variety must be new, distinct, uniform, stable, and sexually reproducible, and the breeder must describe the variety.¹² This protection is further limited by two key exemptions: the research exemption and the saved seed exemption.¹³

Under the research exemption, seed protected by a PVP certificate may be used by competitors, without infringing the rights of the certificate holder, to breed new varieties of seed and for any “bona fide” experimental

The Seed Industry in U.S. Agriculture: An Exploration of Data and Information on Crop Seed Markets, Regulation, Industry Structure, and Research and Development, AGRIC. INFO. BULL. NO. 786, at 3 (Jan. 2004).

8. 35 U.S.C. §§ 161-164 (2000).

9. Jim Chen, *The Parable of the Seeds: Interpreting the Plant Variety Protection Act in Furtherance of Innovation Policy*, 81 NOTRE DAME L. REV. 105, 110 (2000) (“At least in the case of self-pollinating plants, seeds reproduce of their own accord. ‘Copying,’ often a deviant and difficult deed for would-be infringers in many other industries, is the definition of agriculture.”).

10. See generally Nathan A. Busch, *Jack and the Beanstalk: Property Rights in Genetically Modified Plants*, 3 MINN. INTELL. PROP. REV. 1 (2002).

11. *Asgrow Seed Co. v. Winterboer*, 513 U.S. 179, 181 (1995) (“Congress passed the [PVPA] . . . in order to provide developers of novel plant varieties with ‘adequate encouragement for research, and for marketing when appropriate, to yield for the public the benefits of new varieties’ The PVPA extends patent like protection to novel varieties of sexually reproduced plants (that is, plants grown from seed) which parallels the protection afforded asexually reproduced plant varieties (that is, varieties reproduced by propagation or grafting) under Chapter 15 of the Patent Act.”).

12. 7 U.S.C. § 2422 (2000).

13. *J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int’l, Inc.*, 534 U.S. 124, 140 (2001); see also William Lesser, *The Impacts of Seed Patents*, 9 N. CENT. J. AGRIC. ECON. 37, 40 (1987) (“Under the PVPA research exemption, a protected seed variety may be used by a competing company in a breeding program. For example, if a protected flower variety has red and white flowers, a competitor, using purchased seed could select for a strain which produces only white flowers and receive a Certificate for that new variety The [saved seed] exemption . . . allows farmers to retain seed for planting and even for sale, provided the variety name is not used.”).

purpose.¹⁴ This exemption allows competitors to test their herbicide on a protected variety, compare traits of different seeds under varying circumstances, and even “‘use it in a breeding program to develop new commercial varieties,’ at least as long as such new varieties are different enough not to be ‘essentially derived’ from the original protected variety.”¹⁵

The second of these exemptions, the saved seed exemption, allows any farmer who “legally purchases and plants a protected variety [to] save the seed from these plants for replanting on his own farm.”¹⁶ Farmers have been saving seed for as long as farmers have been planting seed, and this exemption recognizes that practice.¹⁷ However, every seed saved and replanted represents a lost sale—thus the power of this exemption.¹⁸

14. “The 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 chapter.” 7 U.S.C. § 2544.

15. Chen, *supra* note 9, at 110, 132. Please see this article for a further discussion of both the saved seed and the research exemption to the PVPA.

16. *J.E.M. Ag Supply Inc.*, 534 U.S. at 140.

[I]t shall not infringe any right hereunder for a person to save seed produced by the person from seed obtained, or descended from seed obtained, by authority of the owner of the variety for seeding purposes and use such saved seed in the production of a crop for use on the farm of the person, or for sale as provided in this section. A bona fide sale for other than reproductive purposes, made in channels usual for such other purposes, of seed produced on a farm either from seed obtained by authority of the owner for seeding purposes or from seed produced by descent on such farm from seed obtained by authority of the owner for seeding purposes shall not constitute an infringement.

7 U.S.C. § 2543 (2000).

This limitation is not well-liked by the seed companies, and some have tried to extend the protection of the PVPA through marketing. At the time this Article was written, one seed company had posted the following misinformation on its website:

Patented seed or seed containing patented genes (such as the Roundup Ready® gene) cannot be saved for replanting. All AG+ Seeds Co. soybean varieties are patented varieties and cannot be saved for seed for the following year under protection of the Plant Variety Protection Act (PVPA). Saving patented soybean seed or seed containing patented genes or technologies is a violation of these patents and is illegal. Seed piracy hinders the development of future technologies and their benefits to the seed industry.

<http://www.agplusseeds.com/roundup.html> (last visited Aug. 8, 2007).

17. Michael Mascarenhas & Lawrence Busch, *Seeds of Change: Intellectual Property Rights, Genetically Modified Soybeans and Seed Saving in the United States*, 46 EUR. SOC’Y FOR RURAL SOC. 122 (2006) (“[A]s long as agriculture has existed, farmers have assumed the universal right to save, replant, and exchange seed from their harvests.”).

18. This is a tremendous weakness, since “a ‘single bushel of soybean seed will produce between 25 and 45 bushels of soybeans’ and ... a ‘single soybean seed, after three crops, will produce 27,000 seeds.’” Chen, *supra* note 9, at 129 (quoting *Asgrow Seed Co. v. Winterboer*, 982 F.2d 478, 480 n.2 (Fed. Cir. 1993) (Newman, J., dissenting from denial of rehearing en banc)).

C. Utility Patent Protection for Plants

With all of the above-described limitations, the PVPA failed to have the intended impact on development of new plant varieties.¹⁹ As a result, agricultural innovators pushed for stronger intellectual property protection for seed—seeking utility patent protection for plants.²⁰ A utility patent is harder to obtain than a PVP Certificate, and, correspondingly, a utility patent provides more protection than a PVP Certificate—there are no equivalent limitations to 35 U.S.C. § 101,²¹ the basis for utility patent protection. Patent protection is available for any “new and useful process, machine, manufacture, or composition of matter”²² that does not “fall within an exception to patentability, such as an abstract idea, natural phenomena, or law of nature.”²³ However, it was not until 1985 that a seed or plant variety was eligible for utility patent protection under the Patent Act.²⁴ Before this date, seeds were viewed as natural phenomena not made by man and, therefore, not eligible for patent protection.²⁵

In 1985, the Patent Office issued a decision in *Ex parte Hibberd*, holding plants patentable as a “‘manufacture’ and ‘composition of matter.’”²⁶ In order to obtain a utility patent, the plant variety must be novel, non-obvious, useful, and described “with sufficient specificity to enable others to ‘make

19. Tirtha Dhar & Jeremy Foltz, *The Impact of Intellectual Property Rights in the Plant and Seed Industry*, in AGRICULTURAL BIOTECHNOLOGY AND INTELLECTUAL PROPERTY: SEEDS OF CHANGE 161 (Jay P. Kesan ed., 2007) (“Most studies of the effects of the PVPA . . . have concluded that the introduction of this type of [intellectual property right] did not induce a significant increase in the amount of research conducted by the industry.”). *But see* Sease & Hodgson, *supra* note 2, at 330 (“Even the modest protection afforded by the PVPA and the PPA has, however, likely had a positive effect on the development of new plant innovations and varieties. For example, in the decade after the PVPA was enacted, three times as many wheat and soybean and six times as many cotton varieties were developed than in the decades prior to the Act’s passage.”).

20. Up to the late twentieth century, it was generally understood that with a few carefully drawn exceptions (such as asexually propagating plants under the Plant Patent Act of 1930 or certain sexually reproduced plants under the Plant Variety Protection Act of 1970), plants and other living organisms were naturally occurring, and as such, unpatentable. Keith Aoki, *Weeds, Seeds & Deeds: Recent Skirmishes in the Seed Wars*, 11 CARDOZO J. INT’L & COMP. L. 247, 279 (2003).

21. “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.” 35 U.S.C. § 101 (2000). In contrast, a PVP Certificate requires neither a showing of usefulness or nonobviousness. 7 U.S.C. § 2402 (2000).

22. 35 U.S.C. § 101.

23. *In re Comiskey*, 499 F.3d 1365, 1371 (Fed. Cir. 2007).

24. *Ex parte Hibberd*, 227 U.S.P.Q. (BNA) 443, 444 (1985).

25. Aoki, *supra* note 20, at 279.

26. 227 U.S.P.Q. (BNA) at 444.

and use' the invention."²⁷ This decision was upheld by the United States Supreme Court in 2001.²⁸ Sixteen years after *Hibberd*, the Court held "that utility patents may be issued for plants."²⁹

II. PROTECTION OF SEED UNDER PRIVATE LAW

One of the underlying tenets of patent law is that innovation requires protection and that absent protection, innovators will lose their edge to imitators.³⁰ Public laws have historically been limited in their protection of agricultural innovation; imitation is the very definition of agriculture,³¹ and yet innovation has occurred.³² It was not until 2001 that the United States Supreme Court recognized the patentability of seed. Despite this, yields have increased, filings for protection of plants through the Patent Office and the Department of Agriculture are up, and applications for field-testing of new plant varieties have increased an astonishing 13,300% from 1987 until 1998.³³ During this time, there was no change in the publicly ordered protection scheme. Instead, the incentive for innovation arose from a revolution in the way seed was distributed.³⁴ Given the limitations inherent in any form of public protection for agricultural innovation, seed companies turned to private ordering to protect their research and development.³⁵ No longer is seed sold; now it is licensed, and with these licenses, the seed market has fundamentally changed.

27. 35 U.S.C. § 101; *J.E.M. Ag Supply Inc. v. Pioneer Hi-Bred Int'l, Inc.*, 534 U.S. 124, 142 (2001).

28. Roberts, *supra* note 4.

29. *J.E.M. Ag Supply Inc.*, 534 U.S. at 127.

30. Michele Boldrin & David K. Levine, *Perfectly Competitive Innovation* (CEPR Discussion Paper No. 3274, 2002), available at <http://ssrn.com/abstract=308040> ("[W]hat would happen to innovations in the absence of legal monopoly protection? Conventional wisdom suggests that . . . competition must necessarily fail to produce innovations.").

31. Chen, *supra* note 9, at 110.

32. "Limiting the scope of [35 U.S.C.] Section 101 to exclude sexually reproduced plants—thus denying that broader protection—would . . . reduce incentives for research and development in the agricultural and horticultural arts." Brief for the United States as Amicus Curiae on Petition for a Writ of Certiorari at 11, *J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int'l, Inc.*, 534 U.S. 124 (2001), available at <http://www.usdoj.gov/osg/briefs/2000/-2pet/6invit/1999-1996.pet.ami.inv.html>.

33. Fernandez-Cornejo, *supra* note 7, at viii.

34. DANIEL CHARLES, LORDS OF THE HARVEST: BIOTECH, BIG MONEY, AND THE FUTURE OF FOOD 308 (2001) (agricultural innovators realized that the "seed business had to become a real business with real control over its products [to capture] the value that [the innovators] felt was rightfully theirs").

35. Marvin L. Hayenga, *Structural Change in the Biotech Seed And Chemical Industrial Complex*, 1 J. AGROBIOTECH. MGMT. ECON. 43 (1998).

III. PROTECTION OF THE DEVELOPMENT PROCESS

In order to understand the impact of private ordering on agriculture, it is helpful to explore the structure of the agrarian economy.³⁶ A typical farmer, Farmer Joan, wants to plant her field with seed that will give her the highest yield for the least work.³⁷ Farmers purchase seed based on its description, the recommendation of the distributor, and its reputation.³⁸ Farmer Joan seeks seed bred for the growing conditions peculiar to her fields. She may want drought-resistant seed or seed that thrives in damp weather, depending on what her almanac says the weather will be like during the growing season, and depending on what she has found worked for her before. She wants a high yield seed that will survive her local weeds and thrive in her climate.

Development of such seed is an art. An agricultural innovator starts with one of a set of carefully guarded seed lines that are maintained as trade secrets by seed companies and that represent the companies' reputation and capital.³⁹ The variety may be protected by a PVP certificate, but more importantly, it is protected by its own reputation. In order to maintain that reputation, the variety is modified on an annual and regional basis.⁴⁰ Different seed is sold in different parts of the country. Seed that has proven particularly resistant to kudzu might be sold in Mississippi, while seed that is

36. Fernandez-Cornejo, *supra* note 7, at 28 (“Plant breeding constitutes the foundation of the modern seed industry in that it creates a unique and marketable product through the application of science. . . . A seed’s success in the market depends primarily on [the research and development] its improved traits, which embody the R&D effort.”).

37. Tom Philpott, *Dominant Traits: Monsanto’s Latest Court Triumph Cloaks Massive Market Power*, GRIST: ENVTL. NEWS & COMMENT., Jan. 17, 2008, <http://www.grist.org/comments/food/2008/01/17/> (“You have to understand how large-scale commodity farmers make decisions. Your neighbor tries a new product, and suddenly boasts weed-free fields and yields that trump yours. He reveals that he bought newfangled, high-dollar seeds—and more than made his money back with the higher yield. So you do the same.”).

38. Personal conversation with Homan McFarling, Jan. 2005 (Homan McFarling is a Mississippi farmer who saved seed that he licensed from Monsanto. He became involved in a lengthy suit with Monsanto as discussed by Philpott, *supra* note 37).

39. Mark D. Janis, *Supplemental Forms of Intellectual Property Protection for Plants*, 6 MINN. J. L. SCI. & TECH. 307, 310 (2004) (“Trade secret protection has long been used in the seed industry. . . . [One example of] trade secret protection that is considered to be typical in the seed industry: trade secrets in the identity and genetics of the inbred parents of a commercially-distributed hybrid.”); JACK RALPH KLOPPENBURG, JR., *FIRST THE SEED: THE POLITICAL ECONOMY OF PLANT BIOTECHNOLOGY 1492–2000*, at 11 (2d ed. 2004) (“[T]he peculiarities of breeding hybrid corn mean that the parent lines of any particular variety can be developed and maintained as trade secrets, thus making hybrid seed a proprietary product.”).

40. Fernandez-Cornejo, *supra* note 7, at vii (“Improved plant varieties are a product of research and development. Seeds embody the scientific knowledge needed to produce a new plant variety with desirable attributes, such as higher yield potential, greater disease resistance, or improved quality.”).

particularly resistant to chickweed might be sold in North Dakota.⁴¹ These modifications are recalculated every year based on market research, changing innovations in the company and industry, and predictions about the next year's crop conditions.⁴²

There is no discussion of patents in the development process, and, indeed, whether a seed is patented or not makes little difference to a farmer.⁴³ The farmer instead wants to know that the seed will produce a high yield; that the developer understands the conditions that the seed will be grown under; that the work of the farmer will be minimized because the seed will resist the local weeds; and that the seed will thrive under the local weather and soil conditions.⁴⁴ A patent does not provide the farmer with this information. First and foremost, therefore, seed companies wish to protect their seed lines. They do so through private ordering.

IV. CHANGING THE LANDSCAPE

The agricultural industry is a highly concentrated field with the majority of the economy controlled by three companies.⁴⁵ Focusing in on the behavior of one such player, Monsanto, and one seed, Roundup Ready soybean seed,⁴⁶ provides a window into the revolution in the seed industry that

41. See generally Paul W. Unger & Merle F. Vigil, *Cover Crop Effects on Soil Water Relationships*, J. SOIL & WATER CONSERVATION 200 (May 1, 1998); see also *Blades v. Monsanto Co.*, 400 F.3d 562 (8th Cir. 2005) (“[G]enetically modified seeds are not homogeneous products. The market for seeds is highly individualized depending upon geographic location, growing conditions, consumer preference and other factors.”).

42. Fernandez-Cornejo, *supra* note 7, at 28 (“The production of certified seed requires strategic planning to ensure that market demand is adequately met. This planning may include determining the quantities of each variety to be produced; determining inventories necessary to produce in excess of forecasted demand to avoid immediate or future shortages; and reducing the risks associated with the unpredictable effects of weather conditions, disease, and pests.”).

43. Roberts, *supra* note 4, at 125 (“Until . . . the PTO reversed its stance on the issuance of utility patents for sexually reproducing plants, seed companies typically employed trade secrets to protect the parental line. Trade secret protection still serves as a valuable tool in protecting the interest of seed producers.”).

44. Fernandez-Cornejo, *supra* note 7, at 28 (“Plant breeders develop seeds embodying such improvements as high yields, resistance to disease and pests, or traits specific to regional agroclimatic conditions. A seed’s success in the market depends primarily on its improved traits, which embody the R&D effort.”).

45. Andrew Douglas, *Biotechnology Delivers New Traits*, COUNTRY GUIDE, Dec. 21, 2006 (“The industry is controlled by 3 main players: DuPont (Pioneer Hi-Bred), Syngenta (NK) and Monsanto (Dekalb). Those three companies develop most of the new traits and license them to each other, smaller seed companies and public breeding programs.”).

46. *Iowa Farmer Sues Seed Company: Pioneer Hi-Bred is Accused of Price Fixing*, GRAND FORKS HERALD, Feb. 6, 2006, § FRM, 2006 WLNR 2038555 (“Roundup Ready soybeans are genetically engineered to withstand the application of an herbicide that kills soybeans.”).

has been brought about by the innovative use of private ordering to protect seed. When Monsanto introduced Roundup Ready soybean seed, Monsanto was looking for a way to break into the inner circle of the industry. It succeeded—and where Monsanto was once “barely active in the seed industry,” now Monsanto controls the soybean market, selling over eighty-seven percent of all soybean seed planted in the United States in 2005.⁴⁷ The landscape has changed.

In Monsanto’s quest to join the inner circle, it realized that cross-licensing was the key to allowing Monsanto access to seed lines owned by Monsanto’s competitors. Therefore, as Monsanto worked to create a market for its product, it simultaneously aggressively licensed its technology to other seed companies.⁴⁸ Monsanto’s marketing worked, and a market was created, both through cross-licensing and through the farmers’ demands. Monsanto was very restrictive with its licenses and allowed its competitors to use its technology as long as the competitors agreed to “not sell seed containing Monsanto’s technology to growers unless the grower signs one of Monsanto’s license agreements.” Furthermore, it required all licensees to require the growers “to grow only a single commercial crop.”⁴⁹ Cross-licensing is at the core of Monsanto’s revolutionary distribution scheme.⁵⁰ Roundup Ready soybean seed is available from a number of seed companies—but every variety of Roundup Ready soybean seed distributed is distributed under license from Monsanto.⁵¹ The Monsanto license contains numerous restrictions—most importantly the restriction that the seed never be sold but only licensed—ensuring the fact that control will never leave Monsanto.

47. *Id.* (“The Roundup Ready seeds were planted on 87 percent of soybean acreage in the United States last year.”).

48. *Monsanto Co. v. McFarling*, 363 F.3d 1336, 1339 (Fed. Cir. 2004) (“Monsanto licenses its proprietary ROUNDUP READY® technology through two interrelated licensing schemes. First, it licenses the patented gene to seed companies that manufacture the glyphosate-tolerant seeds that are sold to farmers. Under this license, seed companies gain the right to insert the genetic trait into the germplasm of their own seeds (which can differ from seed company to seed company), and Monsanto receives the right to a royalty or ‘technology fee’ of \$6.50 for every 50-pound bag of seed containing the ROUNDUP READY® technology sold by the seed company. Monsanto also owns several subsidiary seed companies that comprise approximately 20 percent of the market for ROUNDUP READY® soybeans. Second, Monsanto requires that seed companies execute licenses, rather than conduct unconditional sales, with their farmer customers.”).

49. *Monsanto Co. v. Scruggs*, 459 F.3d 1328, 1333 (Fed. Cir. 2006). Please note that the seed is not actually sold, despite the language of the decision; rather, the seed is distributed under a license agreement.

50. *See, e.g.*, MONSANTO, MONSANTO–DOW AGROSCIENCES GLOBAL AGREEMENT (Jan. 18, 2006), available at <http://www.monsanto.com/monsanto/cotent/investor/financial/presentations/2006/01-18-06.pdf> (allowing Dow to create and license finished hybrids containing Roundup Ready biotechnology).

51. *McFarling*, 363 F.3d at 1339. For the language of the license, see *supra* note 48.

Private ordering and marketing have extended Monsanto's power beyond that available to it through public ordering.⁵² Farmers buy Roundup Ready seed because of Monsanto's marketing⁵³ and innovative distribution practices, not because the seed is better.⁵⁴

V. PROTECTING THE RELATIONSHIP BETWEEN DEVELOPERS AND DISTRIBUTORS

After a seed variety has been developed and propagated, it is distributed through licensed seed distributors. Through marketing and cross-licensing, Monsanto has come to dominate the market as described above, allowing Monsanto to pick and choose its seed distributors. This leads to competition between local seed shops seeking to become licensed seed distributors for Monsanto.⁵⁵

By controlling the market in this fashion, Monsanto can place numerous restrictions on its licensed seed distributors, which it does. In order to distribute Monsanto seed, the licensed seed distributor must sign a lengthy contract containing numerous restrictions.⁵⁶ Chief among these restrictions is the requirement, once again, that the distributor may never sell the seed but only license it.⁵⁷ Furthermore, the distributor agrees not to license the seed to any farmer on Monsanto's blacklist.⁵⁸

52. Some have argued that Monsanto relied not only on marketing, but also on "heavy-handed investigations and ruthless prosecutions that have fundamentally changed the way many American farmers farm." CTR. FOR FOOD SAFETY, *MONSANTO VS. U.S. FARMERS 4* (2005), <http://www.centerforfoodsafety.org/pubs/CFSMonsantovsFarmerReport1.13.05.pdf>.

53. See, e.g., Southeast Farm Press Staff, *Monsanto to Guarantee Roundup Ready System*, SOUTHEAST FARM PRESS, Sept. 6, 2000, http://southeastfarmpress.com/mag/farming_monsanto_guarantee_roundup/ (One example states that Roundup Ready: "soybeans grown in narrow rows add \$16 per acre more to a grower's bottom line than conventional soybeans . . . 'On a 1,000 acre farm, no-till can save as much as 450 hours of time and 3,500 gallons of diesel fuel each year. That's 11, 40-hour weeks in time savings and \$4,000 less for diesel at \$1.15 per gallon.'").

54. Furthermore, Roundup-Ready seed is not necessarily better seed than non-Roundup Ready seed. David S. Bullock & Elisavet I. Nitsi, *Roundup Ready Soybean Technology and Farm Production Costs*, 44 AM. BEHAV. SCIENTIST 1283 (2001). It is significantly more expensive, and does not produce "as high a yield as conventional crops with comparable genomic background." Nathan A. Busch, *Genetically Modified Plants Are Not "Inventions" and Are, Therefore, Not Patentable*, 10 DRAKE J. AGRIC. L. 387, 482 (2005).

55. See, e.g., CHARLES, *supra* note 34, at 177 (One distributor was so concerned that it "w[as] going to be shut out of the market" that it "banded together with . . . other small . . . seed dealers to form a joint venture . . . They hoped that the new company would be substantial enough to earn them a license for Roundup Ready soybeans.").

56. *Id.* at 178.

57. *Id.*

58. *Id.*

What is the blacklist? Any farmer who is alleged to have used Monsanto's seed in a manner not in accord with Monsanto's policies will find his or her name on a list sent to all licensed distributors of Monsanto's products.⁵⁹ The distributors agree to not distribute Monsanto's products to the named farmers. The blacklist bars farmers from purchasing any Monsanto seed, not just the seed the farmer is alleged to have misused.⁶⁰ The blacklist does not discriminate between those farmers alleged to have used, and those proven to have used, Monsanto's seed in a fashion of which Monsanto did not approve.⁶¹ Until (and if) Monsanto determines that the farmer has not breached the license, then Monsanto will blacklist the farmer.⁶² Farmers placed on the blacklist may find themselves scrambling to purchase any seed to plant for the growing season. Monsanto can exercise this level of control because it has a product that farmers and distributors want, and it never lets the product out of its control. If a distributor does not follow the terms of Monsanto's license, the distributor can be sued for breach of contract and may have its license revoked.

VI. PROTECTING THE RELATIONSHIP BETWEEN DEVELOPERS AND FARMERS

At the bottom of the private ordering system is the seed. The fundamental purpose of developing new varieties of distributing seed and of licensing the seed is the farming of the seed. For this to happen, the farmer must acquire the seed. Never having let the seed out of their control, companies such as Monsanto are hardly going to send the seed out to the fields without additional restrictions placed on the relationship with the grower. First and foremost, a farmer wishing to plant Roundup Ready seed must go to his or her local distributor, who is a "seed company with technology li-

59. CTR. FOR FOOD SAFETY, *supra* note 52, at 29.

60. Letter from Christian Mullgardt, Husch & Eppenberger, LLC (Oct. 19, 2006) (on file with author) ("Please be advised that until this matter is resolved, Monsanto does not authorize you or any other individual or entity by, through or with whom you farm to use any seed containing Monsanto's patented biotechnology.").

61. *Id.* "Investigators contacted you . . . in conjunction with an investigation into allegations of replanting saved seed, second generation Roundup Ready soybeans." *Id.* Monsanto states that it: "greatly values its customers and recognizes that growers have many seed variety choices. However, growers who choose to use Monsanto's patented germplasm or seed, such as Roundup Ready varieties, must adhere to the terms of use that govern the respective patented biotechnology." *Id.*

62. Monsanto has aired "radio ads . . . during the fall soybean harvest in which the company named farmers who had been caught saving seed—ads the company calls 'educational' and others call 'intimidating.'" Rick Weiss, *Seeds of Discord; Monsanto's Gene Police Raise Alarm On Farmers' Rights, Rural Tradition*, WASH. POST, Feb. 3, 1999, at A1.

cense(s) from Monsanto or . . . a licensed company's authorized dealer"⁶³ and then agree to Monsanto's terms.⁶⁴ By merely opening a bag of Monsanto seed, the farmer agrees:

To use the seed containing Monsanto gene technologies for planting a commercial crop only in a single season.

To not supply any of this seed to any other person or entity for planting, and to not save any crop produced from this seed for replanting, or supply saved seed to anyone for replanting.

To not use this seed or provide it to anyone for crop breeding, research, generation of herbicide registration data or seed production.⁶⁵

Despite the fact that the primary purpose of this language appears to be the circumvention of the PVP research and saved seed exemptions, this license has been upheld by at least one court since it is

logically intended to protect [Monsanto's] patent monopoly and to thereby permit it to capture revenue in the form of future sales of technology. Without the prohibition against the saving of seed for replanting or resale, Monsanto's patent would soon be rendered useless by virtue of the potential for exponential multiplication of the seed containing its patented technology. Given the risk of Monsanto's thus losing control of its technology, the limited license of its technology was the only reasonable alternative available to it if it hoped to garner a reasonable return on its sizeable investment while making the technology available for commercial use at a reasonable price to consumers.⁶⁶

Monsanto has brought over 100 lawsuits based on licenses containing similar restrictions. Those lawsuits resulted in over \$15 million in recorded judgments for Monsanto.⁶⁷ One farmer served jail time for destroying evidence as a result of Monsanto's suit.⁶⁸

VII. A COMPARISON OF THE VARIOUS FORMS OF PROTECTION

Monsanto and other agricultural innovators have sought to protect their product through public and private ordering and in doing so, have circumvented and rendered unnecessary the decision of the United States Su-

63. 2003 Monsanto Technology/Stewardship Agreement (Limited Use License), <http://www.mindfully.org/GE/2003/Monsanto-Technology-Agreement2003.htm> (last visited May 15, 2008).

64. CTR. FOR FOOD SAFETY, *supra* note 52, at 10 ("While statistics on the availability of conventional seed are difficult to find, anecdotal evidence seems to suggest that Monsanto's varieties of genetically engineered seeds have effectively pushed other seed varieties off the market.").

65. *Monsanto Co. v. Ralph*, 382 F.3d 1374 (Fed. Cir. 2004).

66. *Monsanto Co. v. Scruggs*, 249 F. Supp. 2d 746 (N.D. Miss. 2001).

67. Press Release, Ctr. for Food Safety, Monsanto Assault on U.S. Farmers Detailed in New Report (Jan. 13, 2005), available at http://www.centerforfoodsafety.org/-press_release1.13.05.cfm.

68. *Monsanto Co. v. Ralph*, 382 F.3d 1374 (Fed. Cir. 2004).

preme Court in *J.E.M.* It is a useful exercise to see how the private ordering model works in practice.

A. Scenario One: Farmer Saves Lawfully Acquired Seed

Farmer Joan acquires and plants protected seed. Farmer Joan cultivates the protected seed, saves it, and replants it in her field the next year.⁶⁹

1. *Plant Variety Protection Act*

Under the Plant Variety Protection Act, a farmer is entitled to save seed as long as the seed is obtained “by authority of the owner of the variety for seeding purposes.”⁷⁰ If a PVP certificate protected the seed, and Farmer Joan obtained the protected seed by authority of the owner, then she is not infringing the PVPA by saving the seed and replanting it in her own field. This is one of the limitations of the PVPA. If the owner of the protected variety is relying solely on the PVPA for protection, there is no infringement here.

2. *Contractual Protection*

Under private ordering, as well as the PVPA, to protect its seed, then the owner is protected. By licensing seed, Farmer Joan has agreed not to save and replant that seed, and in doing so is acting in breach of contract. Farmer Joan will have now earned herself a spot on the owner’s blacklist, and the local seed distributor will be unable to license to Farmer Joan any other varieties of seed that have the same owner without breaching the seed distributor’s contract with the variety’s owner. The breach may have such a chilling effect that the local distributor may be unwilling to do business with Farmer Joan at all for fear of angering the agricultural innovator.

3. *Utility Patent Protection*

Under the Patent Act, if Farmer Joan was able to clean and replant her saved seed, she has arguably used the protected seed in violation of the owner’s patent. The seed would reproduce, thus infringing the patent, and any potential sale of the seed would be a further violation of the patentee’s right to sell the patented seed. The owner could sue Farmer Joan for patent infringement, but would be unable to prevent her from acquiring the seed from her local distributor.

69. This example is based on *Monsanto Co. v. McFarling*, 302 F.3d 1291 (Fed. Cir. 2007).

70. 7 U.S.C. § 2543 (2000).

4. *Conclusion*

The incentive structure for the agricultural innovator to license seed is not impacted by the Patent Act. Without relying on utility patent protection, the owner of the variety can sue Farmer Joan for breach of contract, and can prevent Farmer Joan from selling her seed, replanting her seed, and acquiring other varieties of seed she owns. In other words, the agricultural innovator has protected its bottom line more efficiently, and by preventing Farmer Joan from acquiring other varieties, has protected itself in a fashion stronger than that granted under the Patent Act.

B. Scenario Two: Farmer Saves Seed

Farmer Joan buys and plants unprotected seed. Farmer Joan's neighbor, Farmer Jane, licenses and plants protected seed. The wind blows seed from Farmer Jane's field onto Farmer Joan's field. Farmer Joan cultivates the protected seed, saves it, and replants it in her field the next year.⁷¹

1. *Plant Variety Protection Act*

Under the Plant Variety Protection Act, a farmer is entitled to save seed as long as the seed is obtained "by authority of the owner of the variety for seeding purposes."⁷² If Farmer Jane's seed is protected by a PVP Certificate, then Farmer Joan did not obtain the protected seed by authority of the owner, and therefore is infringing the PVP Certificate by saving the seed and replanting it.

2. *Contractual Protection*

In addition to the infringement of the PVPA, the seed could be protected under private ordering. By planting seed without permission of the owner of the variety, and not under a license from the owner, Farmer Joan will have earned herself a spot on the owner's blacklist, and the local seed distributor will be unable to license to Farmer Joan any other varieties of seed that have the same owner without breaching the seed distributor's contract with the variety's owner. A farmer typically plants multiple varieties of seed every year. The margin on a farm is so low that farmers minimize their odds and maximize the potential margin by planting numerous varieties—ensuring that some seeds will grow if it is a wet summer, while others

71. This example is based on *Monsanto Can. Inc. v. Schmeiser*, [2004] 1 S.C.R. 902 (Can.).

72. 7 U.S.C. § 2543 (2000).

will grow if it is a dry summer.⁷³ So now, Farmer Joan has only the ability to replant the seed she saved from the previous season. In order to plant saved seeds, the seed must be cleaned.⁷⁴ As seen in Scenario Three, the local ginner is unlikely to clean any seed without authorization from the variety's owner. Farmer Joan is unable to process and use her saved seed, and is unable to acquire new varieties from the local seed distributor.

3. *Utility Patent Protection*

The discussion is the same no matter how Farmer Joan acquires the seed, so please see the analysis provided in Scenario One.

4. *Conclusion*

Please see the analysis provided in Scenario One.

73. This is a vastly simplified analysis of the business of farming and is based on a personal communication with Homan McFarling.

74.

The delinting process is an essential step in preparing cottonseed for planting. Virtually all cotton farmers in the United States utilize delinted cottonseed in planting their crops.

To process cottonseed, such as a farmer might purchase from Delta, the seed is first taken to a gin where most of the fiber or lint is separated from the seed. The seed can then be taken to a delinter, such as Sinkers. The delinting process removes the remaining lint. Undelinted, but ginned, cottonseed arrives at Sinkers's Kennett facility in a truck. In some cases, individual farmers bring cottonseed to the facility in pickup trucks. In other cases, however, large quantities of cottonseed, from many different distributors, farmers and farming cooperatives, arrive in tractor-trailer rigs. Upon its arrival at Sinkers's facility, undelinted cottonseed is placed in a "run bin". The seed is then fed into an auger, where it is wetted with a sulfuric acid solution. From there, the seed passes through a centrifuge where the solution is spun off. The seed emerges in a damp-dry condition and is passed through two dryers and two buffers. In the drying and buffing process, all remaining lint is separated from the seed. After culls, sticks and debris are removed from the bulk seed, the seed is treated with chemicals (if the client so requests—this is the "conditioning" stage of the process, the seed having by now been delinted), and then placed in fifty-pound bags. After the seed has been bagged, it is loaded onto trucks and transported to its next destination, which may or may not be the place from which the seed was sent, depending on the instructions given to the delinter.

Delta & Pine Land Co. v. Sinkers Corp., 177 F.3d 1343, 1346 (Fed. Cir. 1999) (footnote omitted).

C. Scenario Three: Ginner Cleans Protected Seed

Farmer Joan licenses and plants protected seed. Farmer Joan cultivates the protected seed, saves it, and takes it to Ginner George to clean so she can replant it in her field the next year.⁷⁵

1. *Plant Variety Protection Act*

Under the Plant Variety Protection Act, a farmer is entitled to save seed as long as the seed is obtained “by authority of the owner of the variety for seeding purposes.”⁷⁶ If a PVP Certificate protected the seed, and Farmer Joan obtained the protected seed by authority of the owner, she therefore is not infringing the PVPA by saving the seed and replanting it. This means that Ginner George can safely clean the seed for her replanting purposes. This is one of the limitations of the PVPA. If the owner of the protected variety is relying on the PVPA for protection, it is unprotected here.

2. *Contractual Protection*

However, if the seed is protected under private ordering, then Farmer Joan is breaching her contract with the agricultural innovator by seeking to have the protected seed cleaned. If Ginner George interferes with that contractual relationship, Ginner George may be liable for tortious interference with contract.⁷⁷ There is no privity of contract between Ginner George and the owner of the seed variety. Farmer Joan, however, would be unable to breach her contract with the owner without Ginner George’s assistance. Ginner George can arguably be found to have interfered in the contractual relationship between Farmer Joan and the owner of the seed variety. There are two main qualifiers to this cause of action. The first is that Ginner George must know of the contract between Farmer Joan and the owner of the seed variety. In an era where eighty-seven percent of the soybean crop planted is genetically modified soybean⁷⁸ and is governed by contract, and

75. The author was unable to find a recorded case where Monsanto sued a seed cleaner who was not also being sued for replanting saved seed. This example is therefore a hypothetical one.

76. 7 U.S.C. § 2543 (2000).

77.

One who intentionally and improperly interferes with the performance of a contract . . . between another and a third person by inducing or otherwise causing the third person not to perform the contract is subject to liability to the other for the pecuniary loss resulting to the other from the failure of the third person to perform the contract.

RESTATEMENT (SECOND) OF TORTS § 766 (1977).

78. *Iowa Farmer Sues Seed Company*, *supra* note 46 (“Roundup Ready soybeans are genetically engineered to withstand the application of an herbicide that kills soybeans.

when seed distributors admit that they no longer sell seed but only license it,⁷⁹ it may be sufficient to prove that Ginner George should have known that the contract existed.⁸⁰ The second qualifier is that Ginner George's action in cleaning the seed must be improper. There are many factors to be evaluated in determining whether Ginner George's action is improper—but if in cleaning the seed Ginner George was motivated by a desire to help Farmer Joan breach the contract, and there was a direct relationship between his conduct and the breach, it is at least a colorable argument that his actions were improper.⁸¹

In addition to the indirect relationship between Ginner George and the owner of the seed variety, many seed cleaners are themselves either farmers or seed dealers, or both. As a result, the seed cleaners have direct relationships with agricultural innovators. As part of these contractual relationships, the seed cleaners agree not to clean protected seed.⁸² In other words, Farmer Joan is going to have a hard time getting her seed cleaned, since Ginner George may be liable for doing so.

3. *Utility Patent Protection*

Under the Patent Act, a ginner who cleans patented seed may be liable for infringement even though he is not directly infringing the patent himself.⁸³ If Ginner George is assisting Farmer Joan in infringing the patent,

The Roundup Ready seeds were planted on 87 percent of soybean acreage in the United States last year.”).

79. On a visit to a distributor in rural Mississippi, the author was informed that that particular distributor, Jimmy Sanders' Seed Shop in Ecu, Mississippi, did not distribute any seed without an accompanying Technology Agreement, or other form of license.

80. In *Delta & Pine Land Co. v. Sinkers Corp.*, the Federal Circuit read a requirement of scienter into the PVP Act and held that scienter meant that the ginner must have known or should have known of the infringement. It was not required that actual knowledge be proven. 177 F.3d 1343 (Fed. Cir. 1999).

81.

In determining whether an actor's conduct in intentionally interfering with a contract or a prospective contractual relation of another is improper or not, consideration is given to the following factors:

- (a) the nature of the actor's conduct,
- (b) the actor's motive,
- (c) the interests of the other with which the actor's conduct interferes,
- (d) the interests sought to be advanced by the actor,
- (e) the social interests in protecting the freedom of action of the actor and the contractual interests of the other,
- (f) the proximity or remoteness of the actor's conduct to the interference and
- (g) the relations between the parties.

RESTATEMENT (SECOND) OF TORTS § 767 (1977).

82. CHARLES, *supra* note 34, at 178.

83. “Whoever actively induces infringement of a patent shall be liable as an infringer.” 35 U.S.C. § 271(b) (2000).

then Ginner George's action may expose him to liability under 35 U.S.C. § 271. By replanting the seed, Farmer Joan may be directly infringing the patent. She is unable to replant that seed without the assistance of Ginner George. When Ginner George cleans the seed, and transfers the cleaned seed back to Farmer Joan, he could be inducing Farmer Joan to infringe the patent in violation of the rights of the owner of the seed. Ginner George and Farmer Joan would be "considered jointly and severally liable for the infringement under a theory of joint tortfeasance."⁸⁴

As in the discussion above for private ordering, it must be shown that Ginner George knew that Farmer Joan would be infringing the patent.⁸⁵ However, "[w]hile proof of intent is necessary, direct evidence is not required; rather, circumstantial evidence may suffice. The inducer must have actual or constructive knowledge of the patent."⁸⁶ Once again, in an era where over eighty-five percent of the soybean crop planted contains the patented Roundup-Ready trait,⁸⁷ and seed does not have to be cleaned to be taken to the grain elevator and sold, but does have to be cleaned to be replanted,⁸⁸ to establish an infringement of the patent, it may be sufficient to prove that Ginner George should have known that Farmer Joan would replant the seed and infringe the patent. In other words, Ginner George's activities could provide sufficient circumstantial evidence to find that he was intentionally inducing Farmer Joan to replant the seed and infringe the patent. Ginner George would therefore be exposed to liability for cleaning Farmer Joan's seed, and would thus be very unlikely to provide this service.

4. Conclusion

Ginner George is liable for cleaning protected seed whether the seed is patented, or protected under a combination of private ordering and the PVPA. If the seed is patented, Ginner George is jointly and severally liable for patent infringement. Under the private ordering system, however, if Ginner George violates the agricultural innovator's rules, Ginner George

84. JANICE M. MUELLER, AN INTRODUCTION TO PATENT LAW 314 (2d ed. 2006).

85. *Id.*

86. *Id.*

87. *Iowa Farmer Sues Seed Company*, *supra* note 46.

88.

Soybeans are like small marbles, brown and hard. They grow in pods hanging from knee-high bushes. When the leaves turn yellow and drop off, it's time to call in the combine. This self-propelled machine roars through the field, ingesting the plants, stripping off the pods, ripping them open, and disgorging the hulls. What's left are the beans themselves along with bits of hull, plant stems, and bits of dirt. These soybeans are fine for taking to the grain elevator, but any farmer who wanted to plant them as seed would want to run them through the seed cleaner.

CHARLES, *supra* note 34, at 186.

may find himself on the innovator's blacklist and would be unable to operate his business. There are strong economic incentives under both systems of protection for Ginner George to decline to clean protected seed.

D. Scenario Four

Farmer Joan acquires and plants protected seed. Farmer Joan cultivates the protected seed, saves it, and replants the seed. Farmer Joan visits Dealer Dan to buy additional seed for her field.

1. *Plant Variety Protection Act*

Under the Plant Variety Protection Act, Farmer Joan can save and replant the seed as discussed in Scenario One, and Dealer Dan faces no penalty for licensing her additional seed.

2. *Contractual Protection*

If, however, Farmer Joan has licensed the protected seed, and is replanting the seed in violation of her license, Dealer Dan faces numerous penalties for licensing her additional seed. As discussed above, in order to license seed, Dealer Dan must enter into contracts with the agricultural innovators. Part of the contract states that Dealer Dan will not license seed to any farmer who is not approved by the agricultural innovator. Farmer Joan's activities will quickly land her on the blacklist, and if Dealer Dan licenses her seed, Dealer Dan is breaching his contract with the agricultural innovator, and may also be placed on the innovator's blacklist himself.

3. *Utility Patent Protection*

Farmer Joan may be infringing the patentee's rights by replanting seed, but Dealer Dan is not violating the patentee's rights in any manner by licensing Farmer Joan's additional seed. This presumes that Dealer Dan does not license Farmer Joan's seed for the express purpose of having her infringe the patent on the seed, but is instead licensing her seed because he is in the business of distributing seed to farmers.

4. *Conclusion*

In this Scenario, private ordering provides stronger protection for the agricultural innovator than the utility patent does. Under the Patent Act, Dealer Dan is doing no wrong by simply distributing seed to farmers, per his normal business practices.

VIII. ENFORCING PRIVATE ORDERING AND ANTITRUST RESTRICTIONS

Agricultural innovators need not rely on the Patent Act to protect seed. Instead, they could choose to rely solely on private ordering and the PVPA to protect seed as discussed above. Whether agricultural innovators rely on public or private ordering to protect their seed, what they cannot do is behave in an anticompetitive manner. If the agricultural innovator is a patentee, then it is not anticompetitive for the innovator to refuse to license its patented technology, as the owner has the right to exclude others from using the patented invention during the term of the patent.⁸⁹ However, if the patentee is unduly restraining trade, and the patented seed is being used by the patentee “not only as a shield to protect his invention, but as a sword to eviscerate competition unfairly . . . [then] that owner . . . may become liable for antitrust violations when sufficient power in the relevant market is present.”⁹⁰

In order to show an antitrust violation, it must be proven that the agricultural innovator has market power and that the market power has been acquired or is being used in an anticompetitive manner.⁹¹ Whether an agricultural innovator has patented his or her technology has no impact on the determination of market power.⁹² Furthermore, if that market power combined with the effect of the innovator’s behavior on the “prices, quantities, qualities, or varieties of goods and services either currently or potentially available”⁹³ is anticompetitive, then hiding behind the shield of a patent will not help.⁹⁴

89. See *In re Indep. Serv. Orgs. Antitrust Litig.*, 203 F.3d 1322, 1328 (Fed. Cir. 2000) (holding that the patent holder “was under no obligation to sell or license its patented parts and did not violate the antitrust laws by refusing to do so”); 35 U.S.C. § 271(d)(4) (2000) (It is not anticompetitive to “refuse[] to license or use any rights to the patent.”); U.S. DEP’T OF JUSTICE & FED. TRADE COMM’N, ANTITRUST GUIDELINES FOR THE LICENSING OF INTELLECTUAL PROPERTY (1995), available at <http://www.usdoj.gov/atr/public/guidelines/0558.pdf> (A patent gives a patentee the right to exclude others from making, using, or selling in the United States, the invention claimed by the patent for a period of time.).

90. *Atari Games Corp. v. Nintendo of Am., Inc.*, 897 F.2d 1572, 1577 (Fed. Cir. 1990).

91. See *U.S. Philips Corp. v. Windmere Corp.*, 861 F.2d 695, 703 (Fed. Cir. 1988).

92. *Ill. Tool Works, Inc. v. Indep. Ink, Inc.*, 547 U.S. 28, 45-46 (2006) (“Congress, the antitrust enforcement agencies, and most economists have all reached the conclusion that a patent does not necessarily confer market power upon the patentee. Today, we reach the same conclusion . . .”).

93. ANTITRUST GUIDELINES, *supra* note 89. See *U.S. Philips Corp.*, 861 F.2d at 703 (quoting *United States v. Ginnell Corp.*, 384 U.S. 563, 570-71 (1966)).

94. Without rendering judgment, examples of potentially anticompetitive behaviors on the part of the agricultural innovators are discussed throughout this Article. Monsanto revolutionized the industry and caused significant structural change in the distribution of seed. It seems fitting, therefore, to use Monsanto as an example. First, Monsanto requires farmers to license patents on corn, soybeans, cotton, sugar beets, and canola, even if the

In deciding cases on the unauthorized use of protected seed, courts continually reference both the patented biotechnology and the licensee—often simultaneously addressing questions of patent infringement and breach of contract.⁹⁵ What is missing in the analysis is the fundamental question of whether agricultural innovators are seeking to enforce their patent rights or engage in monopolistic behavior.⁹⁶ If the latter is true, it makes no difference whether the seeds are patentable or not; the protection of a patent is not sufficient to protect agricultural innovators if their behavior is depriving the farmers of their right to a market in which distributors and farmers can make their decisions about acquiring, planting, and distributing seed free from any unreasonable restraints of trade.⁹⁷ The private ordering

farmer plans to grow only cotton. See *supra* note 61 and accompanying text. Second, in the last twenty years, the cost of soybean seed has more than tripled, while the number of choices on the market has dwindled and Monsanto's market share has risen by some estimates from 15% to over 90%. See, e.g., *Am. Seed Co. v. Monsanto Co.*, 238 F.R.D. 394, 395 (D. Del. 2006) ("Plaintiffs allege that defendants, through the use of financial incentives and bundled rebate programs, have driven competing biotechnology corn seed out of the market, enabling defendants to charge monopoly prices to farmers and retailers."); *Monsanto Co. v. McFarling*, No. 4:00CV84 CDP, 2005 WL 1490051, at *4 (E.D. Mo. June 23, 2005) ("In 1997 experts estimated that only about 15% of soybeans then being planted in the United States used the genetically modified seeds. By the time of the 2005 trial, the number had risen to well over 90%." Third, in order to qualify as a Monsanto seed distributor, a business must "agree[] to limit . . . sales of genetically engineered seed purchased from any other company."). CHARLES, *supra* note 34, at 178. See also *Pullen Seeds & Soil v. Monsanto Co.*, Nos. 06-599-SLR & 06-600-SLR, 2007 WL 2071752, at *1-2 (D. Del. July 18, 2007) ("Of the specific conduct alleged to be anticompetitive, plaintiffs assert that Monsanto was able to maintain its monopoly profits by pursuing 'a systematic licensing and marketing strategy that leveraged its monopoly power in the seed trait markets (including but not limited to glyphosate-tolerant seed trait market) to (a) coerce and/or pressure dealers and distributors to substantially restrict the amount of generic glyphosate herbicides they carried and sold to growers and (b) require growers that wished to plant seeds that contained Monsanto's biotechnology traits to use Roundup herbicide virtually exclusively rather than a competitor's generic equivalent herbicide product.'").

95. *Monsanto Co. v. McFarling*, 302 F.3d 1291, 1294 (Fed. Cir. 2002) ("Monsanto filed suit in the Eastern District of Missouri, charging patent infringement and breach of contract, and seeking a preliminary injunction.").

96. Courts have held that the technology license in and of itself is not anticompetitive because it does not exceed "the boundaries of [the] patent grant." *Monsanto Co. v. McFarling*, 363 F.3d 1336, 1339 (Fed. Cir. 2004). This fails to address the more important question of whether the overall scheme exists to promote the patent rights of agricultural innovators or to unduly restrict trade.

97. *McIntosh v. Monsanto Co.*, 462 F. Supp. 2d 1025, 1030 (E.D. Mo. 2006) ("Monsanto asserts that, as the owner of the patent for the '35S' promoter, it 'had the right to either not license this gene to AgroEvo [sic] at all, or to license it on whatever terms it deemed reasonable, including limiting the amount of Liberty Link soybeans AgroEvo could use the gene to make.' This argument is insufficient to demonstrate that Monsanto is entitled to judgment as a matter of law because patent holders can, under certain circumstances, be liable for antitrust violations in connection with the scope of licensing agreements. Therefore, Monsanto's argument that its conduct is exempt from antitrust liability merely because

system used to distribute seed existed before the United States Supreme Court decided *J.E.M.*⁹⁸ Agricultural innovators, be they patentees or not, may choose to not license their goods—but they may not choose to do so in an anticompetitive manner.

CONCLUSION

What if *J.E.M. v. Pioneer Hi-bred* had not held that seed was patentable subject matter under 35 U.S.C. § 101? Would farmers be able to save seed? Would genetically modified seed cease to exist? What if developers had to rely on other means of protection—would things be any different? The answer to these questions is no.

Publicly legislated protection for agricultural innovation has increased, and innovation has also occurred, but there is no one-to-one correlation between the two. Rather, the innovation has been impacted by the convergence of numerous legal and commercial developments, including: the expansion of patent protection for the tools used in development of new seed; the expansion of a private ordering system used to distribute the seed; the expansion of our understanding of the technology found in the seed; the shrinking number of players in the seed industry;⁹⁹ the shrinking varieties of seed planted; and the decreasing number of alternatives to genetically modified seed. This perfect storm has led to an increase in profitability of seed.¹⁰⁰ Patents have clearly impacted the development of new varieties of seed—without patents it is doubtful that much of the genetic engineering would have occurred at the pace it did.

it owns the ‘35S’ promoter patent does not necessarily demonstrate that it is entitled to judgment as a matter of law.”) (internal citations omitted).

98. *J.E.M. Ag Supply Inc. v. Pioneer Hi-Bred Int’l, Inc.*, 534 U.S. 124, 124 (2001).

99. Interestingly enough,

as the seed industry became more concentrated during the 1990s, private research intensity in biotech maize, cotton and soybeans dropped or slowed down. According to [a] USDA report “those companies that survived seed industry consolidation appear to be sponsoring less research relative to the size of their individual markets than when more companies were involved.”

Mascarenhas & Busch, *supra* note 17, at 133-34.

100. *Id.* at 130-31 (“[I]n 1975 a bushel of soybean seed cost \$7.34. Twenty years later, in 1994, it was \$12.21. However, in 1997, one year after the introduction of Roundup Ready® soybeans, the price of soybean seed jumped to \$17.40 and six years later, in 2003, sold for \$24.20 per bushel. This is not to say that farmers who adopted Roundup Ready® seed necessarily lost money; in addition to saving time and labour, Roundup Ready® technology reduced the need for the conventional herbicides otherwise used with non-GM farming practices. However, that said, Monsanto’s monopoly on the germplasm used in Roundup Ready® seed and near monopoly on glyphosphate gave them considerable discretion with respect to licensing and pricing. Moreover, it is highly unlikely that farmers could abandon the new seed-herbicide system now without suffering significant losses.” (footnote and internal citation omitted)).

However, the patentability of seed has not resulted in an increase in innovation. Seed companies have circumvented public legislation and relied instead on private legislation to protect their interests. They guard their market reputation with zeal; they cloak their annual research tweaking seeds with trade secret protection; they govern their commercialization of the seed through contracts controlling the use of the seed line, the distribution of the seed, and even the planting and growing of the seed; and in the end, corporate interest in developing new plant varieties is limited by corporate interest in its bottom line—and that bottom line is better protected by private regulation. Plants are expensive to develop, expensive to market, and cheap to replicate. Corporations have turned to private ordering to fully protect their interests, and it is private ordering that has led, in part, to the tremendous advances in the development of new seed varieties.

There has been a dramatic increase in private investment in agricultural research, based on the realization that contracts can be used to essentially monopolize the market.¹⁰¹ Furthermore, the profitability of the seed market has led to the “acquisition of major seed companies by agricultural chemical firms” and has “reduced the number of independent seed companies, while simultaneously substantially increasing capital investment for plant breeding and biotechnology research.”¹⁰² All of this has occurred absent judicial recognition that seeds are patentable subject matter—so what if seeds weren’t patentable? Innovation, investment, and institutional change occurred absent such protection, and the use of private ordering has proven far more effective in promotion of the seed industry than the United States Supreme Court and public ordering have.

101. *Id.* (“[P]rivate investment in agricultural research tripled in real terms between 1960 and 1992.”).

102. *Id.*; see KLOPPENBURG, JR., *supra* note 39, at 16 (“Since 1970, an astonishing wave of mergers and acquisitions has swept virtually every American seed company of any size or significance into the corporate folds of the world’s industrial elite. Many of these acquisitions have been made by transnational petrochemical and pharmaceutical firms with substantial agrichemical interests and strong commitments to the commercialization of biotechnology in a variety of sectors. The seedsmen of today are the Monsanto, Pfizers, Upjohns, Ciba-Geigys, Shells, and ARCOs of the world.”).