# SOWING THE SEEDS OF PROTECTION

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Seeds are chattel. As such, seeds are protectable by the same tapestry of public and private ordering as other forms of chattel. However, the distinguishing characteristic of seeds, their method of propagation, and the history of seeds—traditionally viewed as a public good rather than chattel—distort that tapestry. The model of seed distribution thus needs to be reframed in light of the often disparate interests of innovators, producers, and consumers. As with all chattel, there is no single, correct model for distributing seeds, but law and contract may be woven together to strike a balance.



## INTRODUCTION

*Why in the world would anybody spend any money to try to improve the seed if as soon as they sold the first one anybody*

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> *could grow more and have as many of those seeds as they want?*[1]

Agricultural innovators have long sought to answer that very question. Seed must be distributed to be profitable; yet, that very distribution potentially relinquishes control—not only over the seed, but also its progeny. Is it thus necessary for an innovator to recoup its entire investment in one sale?[2] The incentives for innovation remain elusive if distribution relinquishes control over the seed. Contract law can control the distribution of most chattel; as privity can be maintained between the distributor and the distributee. Self-replicating chattel represents a different question altogether. Recognizing this, agricultural innovators have sought to use both private contracts and public law to limit access to the intellectual property embodied in the seed while allowing the profitable access to the physical chattel of the seed necessary to protect the corporate interest in seed innovation.[3]

The questions of what a seed is, and how it should be distributed, are relatively recent. When the United States was founded, seeds were viewed as a public good, distributed to farmers by the government for free on an as-needed basis, saved by farmers from season to season, and traded with neighbors.[4] Today, seeds are a multibillion dollar industry.[5] Seeds are inherently difficult to protect, as they exist to create identical copies of themselves. The incentives of the market have led agricultural innovators to create a new framework of seed distribution that allows developers to control the seed, to limit access to the seed, and to limit the seed itself.

The intellectual property system, as it currently stands, is a poor fit for protection of seed. A poor protection scheme is also a poor incentivization scheme. Agricultural innovators, therefore, have found their own incentives—marrying together private contract law with the public intellectual property laws. This marriage, however, is not being used to simply tailor intellectual property protection to seed; it is changing the framework of seed distribution and propagation. Whereas

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1. Transcript of Oral Argument at 3, *Bowman v. Monsanto*, 133 S. Ct. 1761 (2013) (No. 11-796).

2. "This would be reducing the [patent] term to essentially one and only sale. It would be near impossible to recoup your investments with that first sale and so the more likely consequence is that research dollars would be put elsewhere." *Id.* at 27.

3. *See infra* Part I.A–B.

4. Benjamin Ikuta, *Genetically Modified Plants, Patents, and Terminator Technology: The Destruction of the Tradition of Seed Saving*, 35 OHIO N.U. L. REV. 731, 732 (2009).

5. Sara Schafer, *Inside the Seed Industry*, FARMJOURNAL (Jul. 25, 2013), http://www.agweb.com/farmjournal/article/inside_the_seed_industry.

seed was once freely traded, it is now extensively controlled throughout its lifecycle.[6]

Intellectual property protection for seed is rooted in its history as a public good. Seed is a public good, a commodity, and a chattel. There is no single, correct framework for distributing seeds, but law and contract may be interwoven to strike a balance. The protections set forth in the intellectual property system and the restrictions placed by law and contract on distribution of seed are examined in Part I of this Article. Part II addresses the enforcement of these restrictions by the judicial system. Various models of seed distribution are set forth in Part III.

## I. RESTRICTING THE SEED OR RESTRICTING ACCESS TO THE SEED

Seeds are self-replicating. This fact distinguishes seed from other forms of chattel and increases the difficulties of protecting seed. Innovators seeking investment in seed have developed a legal framework interweaving law and contract. This tapestry of protection strikes a new balance in stark contrast to the historic view of seed as a public good.

### *A. Public Ordering*

Congress has implemented a variety of forms of protection for agricultural biotechnology, and these protections have provided incentives for research and development in agriculture. The incentives provided, however, have been insufficient to promote agricultural innovation because each of these protections has important limitations.

In 1930, Congress enacted the first public law providing protection for agricultural innovation in the United States. The Plant Patent Act (PPA) granted protection to new asexually reproducing seeds, which cannot self-replicate.[7] These seeds are the very seeds least in need of legal protection because they are protected by their nature. Not for another forty years did Congress address sexually reproducing seeds. The Plant Variety Protection Act (PVPA), passed into law by Congress in 1970, grants limited protection for seed through the issuance of Certificates of Protection (PVP certificates).[8] However, the PVPA included numerous explicit and implicit limitations—including a

6. Michelle Ma, *Anticipating and Reducing the Unfairness of Monsanto's Inadvertent Infringement Lawsuits: A Proposal to Import Copyright Law's Notice-and-Takedown Regime into the Seed Patent Context*, 100 CALIF. L. REV. 691, 693 (2012).

7. For more on the historical reasons for this distinction, see *J.E.M. Ag Supply Inc. v. Pioneer Hi-Bred Int'l, Inc.*, 534 U.S. 124, 132 (2001); *see also* Plant Patent Act of 1930, 35 U.S.C. § 161 (2006).

8. Plant Variety Protection Act of 1970, 7 U.S.C. §§ 2421–2422 (2012).

research exemption and a saved-seed exemption.[9] These limitations allow seed covered by a PVP certificate to be used for research and saved by any farmer to replant the farmer's own fields.[10] PVP certificates are issued by the Department of Agriculture and are a weak form of patent-like protection.[11]

The United States Patent and Trademark Office (PTO) offers still further protection for seeds through traditional utility patents. Patent-eligible subject matter is defined in sweeping terms as: "any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof."[12] In 2001, the Supreme Court ruled in *J.E.M. Ag Supply Inc. v. Pioneer Hi-Bred International, Inc.*[13] that seeds fall within this definition as "manufacturer[s]" or "composition[s] of matter" and, thus, are patentable subject matter.[14] This was a landmark decision because, in many ways, the protection granted by utility patents is much broader than PVP certificates. First, utility patents, unlike PVP certificates, can cover a trait found in multiple varieties of seed. Second, there are no research or saved-seed exemptions for seeds protected by utility patents as there are for seeds covered by PVP certificates. Third, if a seed replicates itself, a utility patent may cover the second generation of seed, if the patent is for a genetic trait propagated from one generation of seed to the next.

As strong as utility patent protection for seeds seems there is one limitation on the patentability of plants that the courts have not yet addressed. Courts have "long held that [the Patent Act] contains an important implicit exception: Laws of nature, natural phenomena, and abstract ideas are not patentable."[15] This invites the question: Are plants a natural phenomena and thus not patentable subject matter?

The first plant found to be patentable by the Supreme Court in *J.E.M.* was a hybrid corn seed, which was not genetically modified in any way.[16] The seed was discovered through extensive research and careful cross breeding, but in theory that hybrid corn seed could have

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9. *Id.* § 2422.

10. *Id.*; *Asgrow v. Winterboer*, 513 U.S. 179, 192 (1995).

11. A search on Westlaw by the author showed no evidence that a court has ever found a PVP Certificate invalid or overturned a PVP Certificate for any reason (search terms on file with author).

12. 35 U.S.C. § 101.

13. 534 U.S. 124 (2001).

14. *Id.* at 131–32.

15. *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 132 S. Ct. 1289, 1293 (2012) (internal quotation marks and brackets omitted).

16. *J.E.M.*, 534 U.S. at 127–28.

been found in nature.[17] Hybrid seed is simply the product of cross-fertilization of two parent varieties.[18] When replanted, hybrid seed will not breed true.[19] As a result, if a farmer wishes to grow a hybrid variety, that farmer must have access to new hybrid seed each year.[20] If the seed is a protected variety, then the farmer must purchase the seed from a licensed source. Now, instead of doing this, suppose that the same farmer planted in a field the two parent varieties that, when crossed, create the seed corn variety patented in *J.E.M.* Under natural conditions, some pollen will be windborne from each variety to fertilize the other variety.[21] Commercial propagators who control the fertilization can speed up this process, but suppose this farmer chooses not to do so.[22] The farmer will find infringing corn seed in his field.[23] Should Pioneer be

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17. Hybrid seed corn is created when two species of corn are mated together by fertilizing the flower of one species with the pollen of another species. *Genetically Modified Foods*, PBS, http://www.pbs.org/pov/hybrid/getinvolved_article.php (last visited Jan. 7, 2014).

> The production of hybrid seed requires careful control of the parents. During the experimental phases of developing inbred lines and hybrids, this control is accomplished by covering the ear shoots and tassels with bags and transferring pollen of the desired type by hand. In commercial seed production, control is achieved by the isolation of the seed fields and by the removal of tassels, before shedding of the pollen begins, from the rows to be used as female parents.

*Improving Corn*, USDA, http://www.ars.usda.gov/is/timeline/corn.htm (last visited Jan. 7, 2014). This is the only way to achieve uniformity in the variety.

18. *J.E.M.*, 534 U.S. at 128.

19. *Id.*

20. *Id.*

21. Cross-pollination can occur through the transfer of windborne pollen from one species to another. Tripti Vashisth, *Pollination Techniques*, PLANT BREEDING 21ST CENTURY, http://plantbreeding.coe.uga.edu/index.php?title=19._Pollination_Techniques (last visited Mar. 17, 2014); *see also Organic Seed Growers & Trade Ass'n v. Monsanto Co.*, 718 F.3d 1350, 1357 (Fed. Cir. 2013) ("[T]he district court held that it is likely inevitable that conventional crops will be contaminated by trace amounts of windblown pollen or seeds from genetically modified crops or other sources.") (citing *Organic Seed Growers & Trade Ass'n v. Monsanto Co.*, 851 F. Supp. 2d 544, 548 (S.D.N.Y. 2012)).

22. The farmer is not controlling the cross-fertilization but also is not actively preventing it. Given the windblown pollen, it is highly likely that the patented seed corn at question in *J.E.M.* is the same plant that may be found in nature. *J.E.M.*, 534 U.S. 124. The method of ensuring reproduction of the variety is man-made, but the variety itself is no different than a variety that wind-borne pollen could create under the right conditions. *See, e.g.*, Rattandeep Gill, Clark MacAllister & Tiantian Zhang, *Plant Reproductive Systems*, PLANT BREEDING 21ST CENTURY, http://plantbreeding.coe.uga.edu/index.php?title=4._Plant_Reproductive_Systems (last visited Mar. 17, 2014).

23. As the written description of the patent at question in J.E.M. makes clear:

> The development of a hybrid corn variety involves three steps: (1) the selection of superior plants from various germplasm pools; (2) the selfing of the superior plants for several generations to produce a series of inbred lines,

able to recover damages from the farmer for the farmer's failure to interfere with nature? As the Supreme Court has held, "[g]roundbreaking, innovative, or even brilliant discovery does not by itself satisfy the [patentability] inquiry."[24] Pioneer's patent claim appears to fall "squarely within the law of nature exception."[25] Remarkably, there is no discussion of this question in *J.E.M.*, and no other case law on this point.[26]

To complicate the question of patentability further, many utility patents are being issued covering genetic traits encompassed in seeds. Yet, the Supreme Court recently held in *Association for Molecular Pathology v. Myriad Genetics, Inc.*[27] that human DNA is not patentable if it can be found in nature.[28] The *Myriad* court reasoned that the method of finding DNA may be patentable, and complementary DNA (cDNA) may be patentable, but DNA as found in nature—even in an isolated form—is not statutory subject matter.[29] What impact might the *Myriad* decision have on plants? If a patent is sought on a genetic trait that could be found in nature, then the trait may fall within the "natural phenomena" exception, and therefore not be patentable. By contrast, if a patent is sought on a genetically engineered trait—a manufacture made by man that could not be found in nature—then that trait may be patentable.

In addition to seeking protection through the patent system for seeds, agricultural innovators have relied on other forms of public ordering to protect and promote seed varieties. No discussion of the intellectual property system as it applies to seed would be complete without a discussion of trademark law. Brand protection is best achieved through trademark law that protects any word, slogan, design, or symbol used to identify the source of origin of particular goods and services.[30] Hence, the trademark serves as a source identifier of goods and services,

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> which although different from each other, each breed true and are highly uniform; and (3) crossing the selected inbred lines with unrelated inbred lines to produce the hybrid progeny.

Hybrid Corn Plant and Seed, U.S. Patent No. 5,491,295 (filed Nov. 22, 1994) (issued Feb. 13, 1996). Each of these steps can, and do, occur naturally. The discovery is a way of ensuring reproducibility of a variety, while the patent claims the variety itself.

24. *Ass'n for Molecular Pathology v. Myriad Genetics, Inc.*, 133 S. Ct. 2107, 2117 (2013).

25. *Id.*

26. Furthermore, if the seed corn is naturally occurring, then the patent must fail the test of novelty under 35 U.S.C. § 102 (2012).

27. 133 S. Ct. 2107 (2013).

28. *Id.* at 2111.

29. *Id.* at 2111, 2119.

30. 1 MCCARTHY ON TRADEMARKS AND UNFAIR COMPETITION § 3:1 (4th ed. 2014).

distinguishing one source of seed from another. A trademark allows an agricultural innovator to prevent others from confusing consumers, infringing on the trademark, or trading on another's business and good will.[31] In order for a trademark to have benefit, however, the trademark must provide source identification to a consumer, and that requires marketing and consumer education. One of the most significant innovations in the agrarian business model and agriculture is Monsanto's Roundup Ready soybean seed. Monsanto is a trademark, as are Roundup and Roundup Ready, and Monsanto uses trademark law to protect Roundup Ready soybean seed.[32] The Roundup Ready trademark provides an incentive for competitors to license the trademarked Roundup Ready trait from Monsanto because no other glyphosate-resistant seed has the Monsanto consumer education and marketing force behind it. If a farmer wishes to acquire Roundup Ready soybean seed, trademark law protects Monsanto and ensures that only seed licensed from Monsanto under that trademark can be distributed to that farmer. Trademark law, however, only protects the brand and not the intellectual property associated with the seed itself. The incentives built into trademark law are those of encouraging a business to develop a brand and to educate the consumer about that brand. As can be seen in the discussion of apples in Part III, this can be a very valuable tool in the seed industry but is unlikely to be sufficient incentive in and of itself to promote innovation.

Innovation requires protection to avoid a system of free riders—whereby the first to innovate is the last to profit. This is particularly true in agricultural biotechnology, where self-replicating seed is at issue. Intellectual property protection for seeds has proven to be an uneasy fit at best, leaving many questions unanswered. Rather than waiting for the courts to address these questions, and open new ones, developers have contracted around these questions and have protected seed through a combination of private contracts and public law.

### *B. Private Ordering*

Incentives promote innovation—regardless of whether those rewards are granted by the government or devised by the innovator. Competition provides one such incentive, while the intellectual property system provides another. When neither provides a sufficient prize, innovation may find reward through the protection of contract law.

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31. *See id.*

32. *See, e.g.*, *Monsanto Co. v. E.I. Dupont de Nemours & Co.*, No. 09-686-cv, 2012 WL 3765059, *4 (E.D. Mo. 2012). *See also* ROUNDUP READY, Registration No. 1,889,104.

Farmers acquiring seed bring with them preconceived notions of their rights to the seed. To succeed, private ordering must divorce farmers from those preconceived rights—most importantly the concept of saving seed from one year to the next. The shift in market view of seed as chattel rather than a common good has been inextricably linked with the erosion of farmers' rights in the seed. These trends began with the development of hybrid seed, which is economically sterilized but not biologically sterilized.[33] The seed itself was limited in its ability to propagate: farmers may have had the right to save the seed, but the saved seed would not breed true the following year. As a result, the seed itself eroded farmers' rights. When the farmer was subsequently asked to sign a contract saying that the farmer would not propagate the seed, the farmer was willing to give up the right to replant the seed—because replanting the seed was not a benefit to the farmer. Eventually, the licenses spread to nonhybrid seed as contract law continued the trend of divorcing the farmers' rights from the seed itself and limiting the farmers' rights to the contract signed instead. Hybrid seed led to an innovation in seed distribution not just through the development of new seed, but also through the impact of licenses on the farmers' rights to that seed.

The use of licenses to distribute seed can be traced back to the revolution in protecting chattel that was expedited by the software industry. When software was first introduced to the consumer, it was new, difficult to protect, expensive to develop, and easy to replicate.[34] Furthermore, unlike other forms of chattel, when a consumer acquired a piece of software, the consumer brought to the software acquisition no preconceived set of rights because software itself was something new. When a farmer purchased seed prior to the mid-1990s, the farmer bought with the seed the right to save the seed, the right to plant the seed, the right to propagate the seed, and the right to use the second generation of the seed as the farmer saw fit. When that same farmer purchased a piece of software in the 1990s, the farmer bought only a license to use the software under restrictions set forth by the software developer and distributor.

Other forms of chattel—including books, music, artwork, and even fish—adopted this licensing model, and goods once sold are now

33. *See, e.g.*, *Why Does Monsanto Sue Farmers Who Save Seeds?*, MONSANTO, http://www.monsanto.com/newsviews/Pages/why-does-monsanto-sue-farmers-who-save-seeds.aspx (last visited Jan. 20, 2014) (arguing that economic sterilization is necessary to ensure seed producers are paid for their products and the investments they put into developing their products).

34. *See generally* Ronald J. Mann, *Do Patents Facilitate Financing in the Software Industry?*, 83 TEX. L. REV. 961 (2005) (describing the role that patents play in the software industry).

regularly licensed. These licenses allow the owners of the chattel to become the architects of choice and dictate the default rights associated with these goods. This fundamental shift has allowed the circumvention of publicly legislated rights through the use of contracts. As with intellectual property protection, however, there are some inherent limitations in contract law as well. Most importantly, contract law is limited by privity—as with any contract, there must be a connection between the parties to bring a suit for breach of contract. As a result, seed developers use contracts to license every step of the seed distribution process—from the development of the parent seed, to the propagation of the seed, to the delivery to the seed distributors, to the very farmers' crops themselves. This broad range of control allows the seed developer to maintain privity and to ensure that the title to the seed never leaves the developer's hands.

Licensing chattel allows the owners to place numerous restrictions on the licensee. The impact results in the farmer acquiring fewer rights to the seed than the farmer acquired in previous incarnations of seed distribution. The farmer may be paying more for the seed and the seed may have a higher yield, but when the default rule is to license seed, the ability to opt out can be difficult. It is true that there are many varieties of seed, but the restrictions on the seed are narrowing the practical options of farmers. Many of these licensed seeds also contain patented traits, allowing the developers to further restrict the rights of farmers.

## II. IMPLEMENTING THE RESTRICTIONS

This tapestry of intellectual property protection and contract law has created one of the strongest systems of protection for agricultural biotechnology in the world. Numerous lawsuits have arisen from the system, a few examples of which are discussed below.[35] In each of these cases, the method of protecting the agricultural biotechnology at issue has been implemented in a slightly different fashion with the same results each time. The rights of the farmers have been limited while the rights of the innovators have expanded.

### *A. Public Ordering*

Monsanto developed technology that makes soybean seed glyphosate resistant.[36] Access to the seed containing this technology, known as "Roundup Ready" seed, is highly regulated by Monsanto.[37] All

35. *See infra* Part II.A–C.
36. *Monsanto Co. v. Bowman*, 657 F.3d 1341, 1343 (Fed. Cir. 2011).
37. *Id.* at 1344–45.

farmers licensed to grow Roundup Ready seed agree to a standard agreement known as the Technology Agreement, which limits the farmer to one growing season per seed.[38] Once grown, the seed cannot be replanted; but it may be sold to local grain elevators as a commodity.[39] By licensing the seed to a farmer for one growing season only, Monsanto maintains control over the progeny seed that also contains Monsanto's patented technology.

Vernon Bowman is a soybean farmer from Indiana.[40] He seeded and harvested two crops of soybeans every summer—a first harvest and a late season second harvest.[41] His first harvest was traditionally the more successful harvest, and he licensed Roundup Ready soybean seed from Monsanto on an annual basis for that first harvest.[42] Mr. Bowman viewed the second season crop as riskier and—loathe to pay the high prices to license Roundup Ready soybean seed because he knew that his yield would be lower—he went to a grain elevator[43] and purchased soybean seed.[44] He did so secure in the knowledge that the vast majority of soybean grown around him was Roundup Ready soybean seed.[45] In fact, Mr. Bowman treated his second season crop with glyphosate and used the same farming mechanisms as he did with his licensed first-season crop of Roundup Ready soybeans.[46] The seed for the first-season crop and the seed for the second-season crop were proven to contain Monsanto's patented Roundup Ready technology.[47]

Monsanto brought suit against Mr. Bowman for patent infringement based on his second crop of soybeans.[48] The Supreme Court found that, under the doctrine of patent exhaustion, Monsanto's rights in the progeny seed had been exhausted at the time of the sale of the progeny seed to Mr. Bowman.[49] Mr. Bowman could consume the seed, could resell the seed and could use the seed as animal feed.[50] Under the patent laws, Mr.

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38. *Id.*
39. *Id.* at 1345.
40. *Bowman v. Monsanto Co.*, 133 S. Ct. 1761, 1765 (2013).
41. *Id.*
42. *See id.*
43. *Id.* at 1765 n.1 ("Grain elevators . . . purchase grain from farmers and sell it for consumption; under federal and state law, they generally cannot package or market the grain for use as agricultural seed. . . . But because soybeans are themselves seeds, nothing . . . prevented Bowman from planting, rather than consuming, the product he bought from the grain elevator.").
44. *Id.* at 1765.
45. *Id.*
46. *Monsanto Co. v. Bowman*, 657 F.3d 1341, 1344–46 (Fed. Cir. 2011).
47. *Id.* at 1346.
48. *Monsanto Co. v. Bowman*, 686 F. Supp. 2d 834, 836 (S.D. Ind. 2009).
49. *Bowman*, 133 S. Ct. at 1766.
50. *Id.*

Bowman could not "make *additional* patented soybeans without Monsanto's permission (either express or implied)."[51] The patent laws give the patentee the right to exclude others from making the patented product during the duration of the patent term.[52] According to the Supreme Court, that is "precisely what Bowman did."[53] Here, the patent itself provided limited access to the seed and thus protected the seed because the seed itself contained the patented technology.[54] Mr. Bowman was found guilty of patent infringement.[55]

### *B. Private Ordering*

Homan McFarling is a farmer outside of Tupelo, Mississippi.[56] Each season, Mr. McFarling planted a variety of soybean seeds, evaluated the yield, and saved the best seed for reseeding the next season.[57] The subsequent season, Mr. McFarling seeded his saved seed and supplemented it with other varieties of soybean seed purchased that season.[58] In 1997, Mr. McFarling reseeded saved soybean seed he had licensed from Monsanto in violation of the Technology Agreement.[59] For the first time, Mr. McFarling learned that he had not purchased seed when he went to the local seed shop and exchanged money for physical chattel; instead he had only received a "limited use license" to use the seed for one generation, to not save the seed, to not reseed, and to not distribute its progeny to others for seeding.[60] The courts found that Mr. McFarling's actions breached the license.[61] Mr. McFarling found his access to the seed limited through a license.

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51. *Id.*

52. 35 U.S.C. § 271 (2012).

53. *Bowman*, 133 S. Ct. at 1766.

54. *Id.* at 1764–65.

55. *Id.* at 1764.

56. Elizabeth I. Winston, *Why Sell What You Can License? Contracting around Statutory Protection of Intellectual Property*, 14 GEO. MASON L. REV. 93, 95 n.6 (2006).

57. *Id.* at 95.

58. *Id.* at 95–96, 96 n.9.

59. *Id.* at 95–96.

60. *Id.* at 96.

61. *Monsanto Co. v. McFarling*, No. 4:00B84CDP, 2002 WL 32069634, at *3–4 (E.D. Mo. Nov. 5, 2002), *aff'd*, 302 F.3d 1291, 1293 (Fed. Cir. 2002).

### *C. Public and Private Ordering*

Mitchell and Eddie Scruggs are brothers and farmers in Tupelo, Mississippi.[62] The Scruggs brothers purchased two varieties of genetically modified seed: Roundup Ready soybean seed and Bollgard/Roundup Ready cotton seed.[63] The Scruggs brothers did not agree to the Technology Agreement when they purchased the patented seed.[64] The Scruggs brothers seeded "the purchased seeds, and after harvesting the soybeans and cotton, retained the new generation of seeds."[65] The progeny was used to seed subsequent generations of crops that contained the patented technology.[66]

The Federal Circuit found that Monsanto had the right to control access to its patented technology, and that even though the Scruggs brothers did not sign the Technology Agreement, "there was no unrestricted sale because the use of the seeds by seed growers was conditioned on obtaining a license from Monsanto," which license the Scruggs brothers did not obtain.[67] Furthermore, the court found that the progeny seed was never sold to the Scruggs brothers and that the Scruggs brothers had no rights to the progeny seed.[68] The Federal Circuit stated "[t]he fact that a patented technology can replicate itself does not give a purchaser the right to use replicated copies of the technology."[69] In this case, even though Monsanto's attempts to restrict access to their patented seed did not work as anticipated, Monsanto was still able to rely on those restrictions to limit the Scruggs brothers' access to the seed. This case rests on both restrictions to accessing the seed through the license and restrictions on the seed itself through patent law.

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62. *Monsanto Co. v. Scruggs*, 459 F.3d 1328 (Fed. Cir. 2006). They are the fourth generation to farm their land and run a 150-employee operation. Bartholomew Sullivan, *Supreme Court's Monsanto Case Touches on Mid-South Farmers: Mississippi Case Raises Same Crop Patent Issues Going before Supreme Court*, THE COMMERCIAL APPEAL (Memphis), Feb. 18, 2013, http://www.commercialappeal.com/news/2013/feb/18/supreme-courts-monsanto-case-touches-on-mid/?print=1.

63. *Scruggs*, 459 F.3d at 1333.

64. *Id.*

65. *Id.*

66. *Id.*

67. *Id.* at 1336 ("It is undisputed that Monsanto requires all licensees to place a notice on all bags of Roundup Ready (R) seeds stating that the seeds are covered by U.S. Patents, that the purchase of the seeds conveys no license, and that a license from Monsanto must be obtained before using the seeds. Therefore, the circumstances of the sale indicate that Scruggs had no implied license to use Monsanto's patented biotechnology. Furthermore, because the seed distributors had no authority to confer a right to use Monsanto's biotechnology, they could not confer any sort of license to use the seeds.").

68. *Id.*

69. *Id.*

## III. SEED DISTRIBUTION AND CONTROL MODELS

A seed exists to create a complete and perfect copy of itself. The cost of seed innovation is disproportionate to the cost of seed replication. The industry reflects the impact of this dichotomy. How do you prevent replication of a self-replicating technology? There are very few crops that are profitable enough to engender substantial corporate research and investment. As a result, the vast majority of innovation and genetic modifications have occurred in a small subset of seeds internationally.

A number of different models for seed distribution exist. There is room for more distribution models and for a unification of seed distribution. The rights of the farmer and of the consumer must play a role in answering these questions. A farmer should be able to acquire seed based on which seed the farmer wishes to grow, not which seed the farmer has access to nor which model of distribution is associated with a particular seed. Economies of scale and market demand impact the seed distribution models, but the value of the seed need not dictate the model of distribution. The tapestry of intellectual property protection and private contract law provides for different distribution models for seeds that protect the seed and access to the seed while simultaneously promoting the seed. Several models are discussed in more detail below.

### *A. Table Beets*

From a research perspective, corporate perspective, or a consumer prospective, beets are neither popular nor profitable.[70] In 2001, only around 7,000 acres of table beets were seeded in the United States.[71] The National Agricultural Statistics Service (NASS), a division of the United States Department of Agriculture, conducts surveys and prepares reports on United States agriculture collating statistics of interest to the Department of Agriculture and to farmers everywhere.[72] According to

70. There has been a recent increase in interest in beets: beet leaves are used as salad greens, and roasted beet salad is appearing on some menus in restaurants across the country; however, beets remain largely unpopular and are associated by many consumers with the pickled red vegetable found in grocery store cans. *See, e.g.*, Susan Reimer, *Beets Are Back: Don't Think Cans, Think Fresh Salads and Chilled Soup*, BALT. SUN, July 24, 2013, http://articles.baltimoresun.com/2013-07-24/entertainment/bs-fo-beets-20130724_1_beets-donna-crivello-vegetable-salad.

71. Kurt Nolte, *Table Beets*, U. ARIZ., *available at* http://cals.arizona.edu/fps/sites/cals.arizona.edu.fps/files/cotw/Table_Beets.pdf; *National Statistics for Beets*, NAT'L AGRIC. STATISTICS SERV., U.S. DEP'T OF AGRIC., http://www.nass.usda.gov/Statistics_by_Subject/result.php?1DB07FF6-12C1-357A-B09B-8E5E97E2F3B6&sector=CROPS&group=VEGETABLES&comm=BEETS (last visited Mar. 10, 2014).

72. *About NASS*, NAT'L AGRIC. STATISTICS SERV., U.S. DEP'T OF AGRIC., http://nass.usda.gov/About_NASS/index.asp (last visited Mar. 10, 2014).

their website, they cover "virtually every aspect of U.S. agriculture" and survey farmers regarding all aspects of their work.[73] Beets do not make their research agenda.[74] "The beet guy" is another name for Dr. Irwin Goldman of the University of Wisconsin, who oversees what may be the only table beet[75] public breeding program in the United States.

Beets are a hybrid crop, which helps control the distribution of the seed because they do not breed true.[76] Along with this fact, there is no accepted framework for the distribution of beet seed. The profit margin simply does not support one. The distribution system remains small, with the main parties all known to each other.[77] Due to the small nature of the beet research community, the distribution of beet seed is a far more cooperative arrangement than that of more widely seeded, and profitable seeds. Beets are an industry ripe for the development of a new seed distribution model.

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73. *Id.*

74. Michael Penn, *Professor Upbeat about Unappreciated Root Crop*, UW-MADISON NEWS, Dec. 10, 2002, http://www.news.wisc.edu/8104.

75. Emily Green, *Evolution of an Overlooked Root Vegetable*, CHI. TRIBUNE, Jan. 1, 2003, at 7B.

> Table beets aren't much grown commercially anywhere in America. While the U.S. devotes a staggering 1.4 million acres to growing a cousin, sugar beets, which are big tough plants fit only for sugar extraction and livestock fodder, . . . we grow fewer than 8,000 acres of table beets, more than half of these in Wisconsin for the canning industry.

*Id.*

76. *J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred International, Inc.*, 534 U.S. 124, 128 (2001).

> Hybrid seeds are produced by crossing two inbred corn plants and are especially valuable because they produce strong and vibrant hybrid plants with selected highly desirable characteristics. . . . Hybrid plants, however, generally do not reproduce true-to-type, i.e., seeds produced by a hybrid plant do not reliably yield plants with the same hybrid characteristics. Thus, a farmer who wishes to continue growing hybrid plants generally needs to buy more hybrid seed.

*Id.*

77. The University of Wisconsin, Dr. Goldman's employer, is also a beet seed distributor. Dr. Goldman and the University of Wisconsin continue to develop new varieties of beets. *See, e.g.*, Wis. Alumni Research Found., *Colorful New Table Beets*, *available at* http://www.warf.org/documents/technology-summary/P110151US01.pdf (last visited Mar. 10, 2014). The Wisconsin Alumni Research Foundation currently states on its website that they are seeking "commercial partners interested in new beet varieties" and has an active licensing program on the beet seeds and germplasm covered by Wisconsin's intellectual property. *Id.*

### *B. Corn*

Corn, like beets, grows best as a hybrid crop.[78] The United States Department of Agriculture reports that around 95 percent of corn acreage planted in the United States today is hybrid corn.[79] Hybridization was the first development that divorced the technology of the plant from the nature of the plant, allowing the seed companies to annually profit from sales of the hybrid seed.[80]

In the early 1900s, open pollinated varieties of corn were the only choice available to farmers wishing to grow corn.[81] Like other seeds, farmers saved seed each year and replanted some of that saved crop the next year. Open-pollinated seed bred true.[82] Hybrid corn seed, on the other hand, does not breed true, and therefore new seed must be purchased each year to maximize yield. Hybridization of corn led directly to the commoditization of all seed. In using hybrid corn seed, farmers were committing to purchasing new hybrid seed each year instead of planting saved, open-pollinated seed. Over the last century, there has been a stark shift in corn seed from open-pollinated varieties to hybrid corn seed. The rate of the shift in various parts of the country directly related to the increased profitability of hybrid seed.[83] In other words, a poor hybrid was less likely to result in a shift while a successful hybrid increased per acre profitability—as long as the cost of the seed was kept to a level allowing profitability.[84]

Intellectual property protection would seem tailor-made for hybrid corn. The first plant granted patent protection by the United States Supreme Court was a hybrid corn seed plant.[85] In addition, the nature of

78. "The idea of hybrid corn dates back to the beginning of this century and its first application on a substantial commercial scale to the early thirties." Zvi Griliches, *Hybrid Corn: An Exploration in the Economics of Technological Change*, 25 ECONOMETRICA 501, 501 (1957).

79. JORGE FERNANDEZ-CORNEJO, ECONOMIC RESEARCH SERVICE/USDA, AIB-786, THE SEED INDUSTRY IN U.S. AGRICULTURE: AN EXPLORATION OF DATA AND INFORMATION ON CROP SEED MARKETS, REGULATION, INDUSTRY STRUCTURE, AND RESEARCH AND DEVELOPMENT 2–3 (2004), *available at* http://www.ers.usda.gov/publications/aib-agricultural-information-bulletin/aib786.aspx#.Us3Dz7TOTCQ.

80. Griliches, *supra* note 78, at 522 ("Where the profits from the innovation were large and clear cut, the changeover was very rapid. It took Iowa farmers only four year to go from 10 to 90 per cent of their corn acreage in hybrid corn. In areas where the profitability was lower, the adjustment was also slower.").

81. FERNANDEZ-CORNEJO, *supra* note 79, at 2.

82. *Genetic Diversity of Maize*, U. GA., http://maize.uga.edu/index.php?loc=diversity (last visited Jan. 3, 2014).

83. Griliches, *supra* note 78, at 516, 519.

84. *Id.* at 519–20.

85. That seed, interestingly enough, was seed from Pioneer Hi-Bred, one of the first companies to heavily invest in hybrid seed. Pioneer Hi-Bred's co-founder was Henry

the seed itself limits the farmers' rights in the seed. Despite this, hybrid corn is licensed to farmers and not sold "under a limited label license."[86] One example of such a license states:

> "License is granted solely to produce grain and/or forage." The license "does not extend to the use of seed from such crop or the progeny thereof for propagation or seed multiplication." It strictly prohibits "the use of such seed or the progeny thereof for propagation or seed multiplication or for production or development of a hybrid or different variety of seed."[87]

Even when technology sterilizes the plant economically, licenses are used to ensure that both the seed and the rights associated with the seed are limited. The contracts reinforce intellectual property laws to protect and promote a commercially popular and profitable crop.

### *C. Soybeans*

Soybeans have been at the forefront of the development of new seed distribution models. Soybean seed represents a valuable commodity restricted by both licenses and the intellectual property laws. As discussed in Part I, corporations have used a tapestry of public law and private contracts to control the distribution of soybean seed. Soybeans are not a hybrid plant, so to control the progeny seed, agricultural innovators modified the seed and the distribution network for the seed. In the 1990s, Monsanto introduced Roundup Ready Soybean seed—a seed genetically modified to resist the Roundup brand of herbicide.[88] This allowed farmers to spray a field of Roundup Ready soybean seed with glyphosate and to kill only the weeds in the field and not the soybean crop. Roundup Ready soybean seed was a tremendous and immediate

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Wallace, who went on to become U.S. Secretary of Agriculture. Kevin M. Baird, Pioneer Hi-Bred International v. J.E.M. Ag Supply*: Patent Protection of Plants Grow under the Supreme Court's Latest Decision*, 2002 U. ILL. J.L. TECH. & POL'Y 269, 269; *Our Heritage*, DUPONT PIONEER, http://www.pioneer.com/home/site/about/business/who-we-are/our-heritage/ (last visited Jan. 30, 2014).

86. *J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int'l, Inc.*, 534 U.S. 124, 128 (2001).

87. *Id.* (internal citations omitted).

88. In 1993, a patent was issued for a gene that, when incorporated into soybean seed, produced a genetically modified soybean seed resistant to glyphosate-based herbicides such as Roundup®. U.S. Patent No. 5,352,605 (filed Oct. 28, 1993) (issued Oct. 4, 1994); U.S. Patent No. 5,633,435 (filed Sep. 13, 1994) (issued May 27, 1997). That patent was assigned to Monsanto, and in 1996, Monsanto introduced the first genetically modified soybean seed to the market. *Monsanto Co. v. Ralph*, 382 F.3d 1374, 1377–78 (Fed. Cir. 2004).

commercial success. Today, 90 percent of all soybean seed planted in the United States is Roundup Ready soybean seed.[89] As a result, any discussion of the model of soybean seed distribution must begin with a discussion of how Monsanto innovated the distribution process for Roundup Ready soybean seed.

After genetically modifying the soybean seed and realizing the potential commercial impact of the product, Monsanto was faced with the question of how to protect its tremendous investment. Monsanto realized that the intellectual property system did not provide enough protection over the Roundup Ready soybean seed and its progeny. Therefore, Monsanto chose to rely on contract law and the intellectual property system. Monsanto licensed the seed to farmers and seed shops, and controlled the seed through a variety of strictures from corporate headquarters.[90] Farmers no longer had the ability to purchase Roundup Ready soybean seed, or to save seed for the following year. Instead, farmers license the seed for a one-time propagation use. Violation of these strictures, as discussed in Part I, led to patent infringement suits and suits for breach of contract.

There are a large number of public breeding programs, focused on the development of new varieties of both conventional and genetically modified soybean seed.[91] Even these public programs rely on this interwoven system of public law and private contracts. Conventional seed may be released as public varieties, but the genetically modified soybean seed is licensed per the arrangement above and therefore cannot be released as a public variety.[92] Contract law and the intellectual property system have provided a tightly woven net of protection around Roundup Ready soybean seed.

### *D. Apples*

As discussed in Part I, trademark law plays a vital role in intellectual property protection. Like patent law, trademark law can be reinforced through licenses to give an agricultural innovator a greater

89. Robert Langreth & Matthew Herper, *The Planet versus Monsanto*, FORBES, Jan. 18, 2010, at 64 ("Ninety percent of the U.S. soybean crop . . . [is] grown with seeds containing Monsanto's technology.").

90. *Ralph*, 382 F.3d at 1377.

91. *See* D.A. Sleper & J.G. Shannon, *Role of Public and Private Soybean Breeding Programs in the Development of Soybean Varieties Using Biotechnology*, 6 AGBIOFORUM 27, 29–30 (2003), *available at* http://www.agbioforum.org/v6n12/v6n12a08-sleper.pdf.

92. *See, e.g.*, *2010 North Carolina Research Update*, N.C. SOYBEAN PRODS. ASS'N (Aug. 2010), *available at* http://www.ncsoy.org/LinkClick.aspx?fileticket=ylHP%2FQN3XUo%3D&tabid=1026.

control over a seed variety than trademark law alone would allow. The apple industry has been at the forefront of exploring this intersection of public law and private contracts. Like any seed, apples can be protected through plant patents and utility patents. In addition, through the release of managed and club apples, trademarks have been used to educate the consumer to request a seed variety by a brand name, rather than a variety name.

For an example of this, we can look at the University of Minnesota and the Honey Crisp apple variety. Minnesota patented the Honey Crisp variety and distributed it as an open release variety.[93] An open release variety can be purchased by anyone who wants to grow that variety and can be grown under any conditions.[94] The University of Minnesota sold copies of the Honey Crisp tree widely, and the seed patent on the Honey Crisp, "combined with sales rights abroad," is estimated to have "earned the University of Minnesota more than ten million dollars in royalties, making it the third-most-valuable invention ever produced there."[95] However, the breeders found that allowing the seed to be grown by anyone resulted in a wide variation in quality, and, as consumers found they could not count on the Honey Crisp crunch every time, the brand suffered.[96]

One well-known apple variety that uses trademarks to protect its brand is the "Pink Lady" apple. The "Pink Lady" apple is a managed variety that relies heavily on its trademark to ensure that only a limited number of apples on the mark will be labeled "Pink Lady" and that each of the growers licensed to grow "Pink Lady" apples will meet guidelines set forth by the owner of the mark.[97] "Pink Lady" is a brand name, and not a variety name. The variety of apple known as a "Pink Lady" is in fact the "Cripps Pink Variety."[98] The holder of the "Pink Lady" mark developed an apple variety[99] and then built a brand around the variety

93. John Seabrook, *Crunch: Building a Better Apple*, THE NEW YORKER, Nov. 21, 2011, at 59–61.

94. *Id.* at 59 ("Finally, a truly outstanding apple is named, the tree is patented, and clones are released to nurseries, where thousands of copies of the trees are made and sold to growers, for which the university collects a royalty of around a dollar per tree during the life of the patent."); *see also* Melissa Block & John Seabrook, *"Managed" Apple Creates a Buzz*, NPR ALL THINGS CONSIDERED (Nov. 18, 2011), http://www.npr.org/2011/11/18/142518957/managed-apple-creates-a-buzz.

95. Seabrook, *supra* note 93, at 59.

96. *Id.* at 60.

97. *About Pink Lady Brand*, PINK LADY AM., http://www.pinkladyamerica.org/about (last visited Jan. 11, 2014).

98. *Cripps Pink vs Pink Lady Apples*, EARL'S ORGANIC PRODUCE (Jan. 17, 2013), http://www.earlsorganic.com/cripps-pink-vs-pink-lady-apples.

99. The "Cripps Pink" variety is the same as the "Pink Lady" variety and is "a cross between a Golden Delicious apple and a Lady Williams apple." *Id.*

using a trademark and marketing to control access to the brand.[100] The "Pink Lady" is one of several "club" or "managed" apple varieties.[101] For many of these managed varieties, apple growers pay a licensing fee to the holders of the trademark in return for permission to use the trademark label on their product.[102] "Pink Lady" is trademarked.[103] There is no cost to use the "Pink Lady" trademark; but, to use the mark, farmers are required to sign a license agreement setting forth brand standards.[104] If an apple is labeled a "Pink Lady," it comes from a licensed source, and the consumer knows that it meets certain standards.[105] From the grower's perspective, the trademark holder is marketing the name and inducing consumers to purchase the apple bearing the "Pink Lady" label rather than the Cripps Pink variety.

After the impact of the open release on the Honey Crisp brand, Minnesota wanted stronger protection for the next apple it developed, the SweeTango apple, whose parentage included the Honey Crisp apple.[106] To protect the SweeTango apple, Minnesota sought to protect the seed and the brand, weaving together licenses and intellectual property protection to extend the developer's control over the SweeTango apple.[107] SweeTango was released as a managed variety, exclusively licensed by Minnesota to a select group of dealers.[108] Minnesota hoped to use this tapestry of protections to avoid the reputation damage associated with Honey Crisp apples being grown in suboptimal conditions.[109] To grow SweeTango apples, dealers must agree to grow no more than one thousand trees and to not pool their apples for sale to the wholesale market.[110] The consortium behind SweeTango pays the University of Minnesota a royalty on the apple's net wholesale sales and controls the wholesale market for the SweeTango apple.[111]

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100. *Pink Lady Apple Tree*, GARDENFOCUSED.CO.UK, http://www.gardenfocused.co.uk/fruitarticles/apples/variety-pink-lady.php (last visited Jan. 13, 2014).

101. This includes Gala, SweeTango, and Jazz apples. *See* Block & Seabrook, *supra* note 94.

102. Joanna Blythman, *The Jazz Apple: A Privatisation of Nature*, GROCER, July 13, 2013, at 21.

103. *See supra* note 97.

104. George Morgan, *Trademark Fight Moves to Apples*, MORGAN L. OFF. (July 11, 2012), http://patentaz.com/1143/trademark-fight-moves-to-apples.

105. *See id.*

106. Steve Karnowski, *Hot New Apple: SweeTango, Spicy and Sweet*, THE EDGE: S.F. (Sept. 19, 2010), http://www.edgesanfrancisco.com/index.php?ch=style&sc=home&sc3=&id=110473.

107. *Id.*

108. *Id.*

109. *Id.*

110. *Id.*

111. *Id.*

These limits can be enforced for apples because the nature of apples is to change. In other words, a Honey Crisp apple seeded in a Red Delicious Orchard will eventually take on the characteristics of the Red Delicious apple through "red drift."[112] Furthermore, cross-pollination will result in a tree that is not a true Honey Crisp apple tree, and the apple won't taste the same, won't look the same, and won't sell the same.[113] As a result, growers return to a source to purchase new trees on a regular basis, and therefore control over the apple sources leads directly to control over the seeds. The model of a managed variety, particularly one emanating from a public institution, has not been without controversy and without competition.[114] There are Cripps Pink apples being sold without the "Pink Lady" mark,[115] and SweeTango has prompted concerns among Minnesota farmers about the allocation of public resources.[116] This being said, between changing the seed and changing the model of distribution, this tack of managed varieties has been very successful in the apple industry. Between brand education, the nature of the seed, and the revolution in the distribution model, this tapestry has incentivized innovation.

### *E. Arabidopsis*

On April 23, 2013, Antony Evans initiated a Kickstarter[117] campaign seeking to raise $65,000 to develop glow-in-the dark plants by genetically modifying Arabidopsis.[118] Using glowing genes from fireflies and bacteria,[119] the campaign aimed to modify Arabidopsis to glow in the dark without electricity.[120] Over eight thousand people donated money to the campaign, raising almost a half million dollars in approximately six

112. Seabrook, *supra* note 93, at 60.

113. *Id.*

114. Karnowski, *supra* note 106.

115. Morgan, *supra* note 104.

116. Karnowski, *supra* note 106.

117. *See* Antony Evans, *Glowing Plants: Natural Lighting with No Electricity*, KICKSTARTER (Apr. 23, 2013), http://www.kickstarter.com/projects/antonyevans/glowing-plants-natural-lighting-with-no-electricit; *see also* Virginia Postrel, *The Kickstarter Culture Wars*, TIME, Aug. 26, 2013, *available at* http://content.time.com/time/magazine/article/0,9171,2149613,00.html#ixzz2huqqi1pv.

118. Arabidopsis is a member of the mustard family, selected because "it is easy to experiment with and carries minimal risk for spreading into the wild." *Kickstarter Crowd Gives Glowing Plant the Green Light*, BBC (May 7, 2013), http://www.bbc.co.uk/news/technology-22433866.

119. *Id.* ("The team will work with luciferase, an enzyme common in fireflies as well as some glowing fungi and bacteria.").

120. Postrel, *supra* note 117.

weeks.[121] The campaign pledged to send every qualified American backer seeds enabling them to grow a glowing plant at home.[122] In addition, the developers share online the progress of their research, their DNA constructs, and the issues they are facing in development.[123] This is a radically different model for seed development and distribution.

The glowing plant distribution model relies on Kickstarter's crowd-funding nature and the freedom that such a campaign gave the developers to do research outside of traditional labs.

> One of the benefits of funding a project like this through Kickstarter is that you aren't beholden to the interests of traditional shareholders or government funding agencies. This means we can stay closer to our values and pursue a philosophy of Radical Openness and today we wanted to tell you about why we are doing this and what it means for you our backers. . . . Traditionally a project like this would have been done either in a research institute or in a company with investors. Both these groups would have required strong IP protection and patents. This has two effects, first it reduces collaboration and second it restricts progress as it makes it harder for others to build on this work. . . . Because of your support we are able to do something different. All of the output from this project will be released open source - the DNA constructs, the plants etc. If you get seeds from your plants they are your seeds to grow more plants or give to your friends as you wish.[124]

Antony Evans has put genetically modified seeds on the crowdfunding map, has agreed to open source the output from the research, and is currently developing the promised plant. However, Antony Evans also brought to the public eye much of the social discomfort with seeds as chattel. Kickstarter identifies itself as an environment to raise money for ideas, not for chattel, "steadfastly maintain[ing] that it's not a place to sell products."[125] Despite this, the "most successful projects attract donors who want a version of whatever the organizers are producing, whether that's the DVD of a documentary

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121. Evans, *supra* note 117.

122. *Id.*

123. GLOWING PLANT BLOG, www.glowingplant.com/blog (last visited Jan. 10, 2014).

124. Antony Evans et al., *Update #7: Radical Openness*, KICKSTARTER (May 2, 2013), https://www.kickstarter.com/projects/antonyevans/glowing-plants-natural-lighting-with-no-electricit/posts/469999.

125. *See* Postrel, *supra* note 117.

film or a watch made from an iPod Nano. Thousands of people, it turned out, wanted seeds for glow-in-the-dark plants."[126] Opposing this project, environmental organizations wrote to Kickstarter and the United States Department of Agriculture stating that "[t]he project 'will likely result in widespread, random and uncontrolled release of bioengineered seeds and plants produced through the controversial and risky techniques of synthetic biology.'"[127] Seed, like other forms of chattel, is sold on etsy, eBay, and Amazon, among other popular online marketplaces. Genetically modified seed is available for sale on Amazon. For Kickstarter to differentiate between chattel and genetically modified "organisms" says that Kickstarter thinks of seed differently.[128] Perhaps cognizant of the difficultly in distinguishing between forms of chattel in enacting a ban on the distribution of genetically modified organisms, Kickstarter does not suggest that the campaign was illegal; instead, stating that Kickstarter would be happy to be a platform for funding the development of biotechnology but not the product of that biotechnology.

The development of glowing Arabidopsis illustrates unease with the underlying premise that seeds are chattel. Paralleling that concern is the unease of the developers with the traditional seed distribution model. If seeds are a public good akin to information instead of chattel, then the tapestry inhibits distribution and cloaks the seeds in secrecy. If seeds are chattel, then the tapestry of protection may incentivize innovation. The dichotomy is inherent in the nature of seed as a good in and of itself and a source of information to be propagated in future generations.

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126. *Id.*

127. Andrew Pollack, *A Dream of Trees Aglow at Night*, N.Y. TIMES, May 7, 2013, http://www.nytimes.com/2013/05/08/business/energy-environment/a-dream-of-glowing-trees-is-assailed-for-gene-tinkering.html?partner=rss&emc=rss&_r=0 (quoting a letter from Friends of the Earth and the ETC Group).

128. Per Kickstarter rules, there are a few other rewards also banned besides genetically modified organisms. *See Prohibited Items*, KICKSTARTER, http://www.kickstarter.com/help/prohibited (last visited Mar. 20, 2014) ("In addition to our guidelines, there are some things we don't allow on Kickstarter: Kickstarter cannot be used to buy real estate. . . . Projects cannot offer alcohol as a reward. . . . Projects cannot offer genetically modified organisms as a reward. . . . No self-help material (books, videos, etc). This includes projects that offer (or produce materials that offer) business, emotional, financial, health, medical, sex/seduction, or other self-help advice. . . . No offensive material (hate speech, etc.); pornographic material; or projects endorsing or opposing a political candidate. . . . No tobacco, drugs, and drug paraphernalia; energy food and drinks; or nutritional supplements. . . . No bath, beauty, and cosmetic products; electronic surveillance equipment; eyewear (sunglasses, prescription glasses, and others); firearms, weapons, knives, weapon accessories, and replicas of weapons; medical, health, safety, and personal care products; or infomercial-type products.").

### *F. Open Source Seed Initiative*

It is evident that there is no one seed distribution model that will work for every type of seed. Indeed, each market is subject to different demands from consumers, farmers, and developers. It is further evident that for many seeds, there is currently no seed distribution model that meets the needs of the developers and consumers. One model currently under development is the Open Source Seed Initiative (OSSI). This model is being "[o]rganized by a working group of public seed breeders, private breeders, non-governmental organizations, and sustainable food system advocates."[129] The primary purpose of the OSSI is to develop "open source" licenses for seeds reserving rights to breeders and to farmers.[130] Modeled on the successful open source software distribution model,[131] OSSI is designed to create "a 'protected commons' populated by farmers and seed breeders whose materials would be freely available and widely exchanged but would be protected from appropriation by those who would monopolize them."[132]

One of the dominant open source software model is the GNU General Public License ("GPL"), which requires that "[l]icensees of computer programs that are licensed pursuant to the GPL are not charged for the license, but are required to license any derivative works that they create using the licensed software under the same terms and conditions. . . ."[133] Software is information and therefore can use copyright to enforce this license. Seed is not protected by copyright, nor is all seed protected by patent law or trademarks. This lack of publicly ordered protection has caused numerous practical problems for the implementation of an OSSI license. As a result, OSSI has been forced to rely on contract law with its inherent restrictions.

To complicate matters further, there are many factions within the agricultural industry with different goals and aims in mind, rendering the issue of a single OSSI license, similar to the GPL, moot. There are

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129. Jack Kloppenburg, *Re-Purposing the Master's Tools: The Open Source Seed Initiative and the Struggle for Seed Sovereignty* 2–3 (Yale Univ. Int'l Conference: Food Sovereignty: A Critical Dialogue, Conference Paper No. 56, 2013), *available at* http://www.yale.edu/agrarianstudies/foodsovereignty/pprs/56_Kloppenburg_2013.pdf.

130. *Id.* at 3.

131. The Ninth Circuit defined open source software as "meaning that the source code is either in the public domain or is copyrighted and distributed under an open-source license that allows modification of the software, subject to some restrictions." *Metro-Goldwyn-Mayer Studios, Inc. v. Grokster, Ltd.*, 380 F.3d 1154, 1159 (9th Cir. 2004).

132. Kloppenburg, *supra* note 129, at 3.

133. *Wallace v. Int'l Bus. Machs. Corp.*, No. 1:05-cv-678 RLY-VSS, 2006 WL 1344055, at *1 (S.D. Ind. May 16, 2006); *GNU General Public License*, GNU OPERATING SYS. (June 29, 2007), http://www.gnu.org/licenses/gpl.html.

breeders who wish to protect genetically modified seed through an open source license, and there are farmers opposed to all forms of genetically modified seed.[134] In some crops, the breeders wish to charge for their seed—even if released through an OSSI license—while in other crops, the thought of profit is anathema.[135] The GPL does not directly address this, allowing implementers to choose whether to charge or not for their software.[136] Using contracts to implement the OSSI does not grant the same freedom to implementers.[137] As a result, again, multiple OSSI licenses are being developed to address these issues.[138] Each license honors the core principles of OSSI—namely, that recipients of OSSI-licensed seed are free to use the seed for research purposes and that any seed developed with OSSI-licensed seed must itself be distributed under the same OSSI license covering the parent seed.[139] Despite these many obstacles, however, the first OSSI licenses have been drafted, and seed will be released using OSSI licenses in 2014.[140] Implementation of the OSSI licenses will give farmers and developers one more opportunity to reframe the model of seed distribution.

## CONCLUSION

Chief Justice John Roberts's question[141] has an easy answer: nobody would spend money to innovate seed if the innovation could be replicated and redistributed by anyone planting the seed.[142] How best to protect innovation in the seed industry? That is a much harder question to answer. Intellectual property protection, for all the reasons set forth above, remains at present an uneasy fit for self-replicating chattel. Contract law brings its own limitations and complications. Any distribution of the seed is fraught with the possibility that the seed and its progeny may erode the developer's control. Incentives provided by the market are not sufficient to bear the price of research and development in a single season's seed price.

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134. Kloppenburg, *supra* note 129, at 1, 15.

135. *Id.* at 20–22.

136. *Id.* at 21; *GNU General Public License*, GNU OPERATING SYS. (June 29, 2007), http://www.gnu.org/licenses/gpl.html.

137. Kloppenburg, *supra* note 129, at 18, 22.

138. *Id.* at 21.

139. *Id.* at 19–22.

140. Irwin L. Goldman et al., *The Open Source Seed Initiative*, AM. SOC'Y FOR HORTICULTURAL SCI. (July 23, 2013, 12:30 PM), http://ashs.org/abstracts/2013/abstracts13/abstract_id_14247.html.

141. *See supra* note 1 and accompanying text.

142. *Id.*

Seeds are chattel. As with all chattel, there is no single model that best works to distribute disparate types of seed. In weaving public and private ordering together, the idea of promoting innovation through reward must not be allowed to overwhelm the humble origins of this self-propagating chattel. There is clear evidence of a trend towards more and stronger protection for seeds. Sowing the seeds of protection requires a reevaluation of the current relationships between the intellectual property system; private contracts; and the needs of farmers, consumers, and innovators. There should be no question of the value of seed innovation, nor should there be any questions as to how to incentivize such innovation.