

MONSANTO V. SCRUGGS:
THE NEGATIVE IMPACT OF PATENT EXHAUSTION
ON SELF-REPLICATING TECHNOLOGY

By Jason Savich

The rise of patented seed technology has sparked heated debate over who—patentee or purchaser—may control the seed generated by the original patented seed. For the farmer, purchasing patented seed implies using subsequent generations of seed regardless of whether the initial seed contained patented technology. Seeds grow and create more seeds just like the seed purchased. For the inventor of seed technology, however, subsequent generations of seed are completely different entities from the original seed. Regardless of the source and means of production, the inventor believes that she retains control over new seeds, which the farmer has not purchased rights to use.

While both parties have viable arguments, economic concerns require protecting an inventor's right to subsequent generations of seed. Patentees face a unique challenge when trying to make a return on their investments on technologies that are self-replicating because every consumer turns into a potential producer. Thus, an inventor must have sufficient legal and/or technological protections to allow her to make a return on her initial investment in research and development ("R & D") before competing against those who have not made that investment. The incentive to invest, however, must be balanced with the diffusion of current innovations and promotion of future innovations to allow the greatest amount of innovation for the benefit of society.

The impact of self-replicating technologies has been particularly significant in the agricultural-biotech industry where companies like Monsanto face the problem of protecting their self-replicating technology while trying to make a return on their investment in R & D. Numerous farmers purchase Monsanto's Roundup Ready® seeds containing genetically engineered herbicide- and insect-resistant traits.¹ In addition to protections provided by patent law, Monsanto requires purchasers to sign licensing

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1. See MONSANTO CO., FINAL YEAR-END REPORTING: MONSANTO BIOTECHNOLOGY TRAIT ACREAGE: FISCAL YEARS 1996 TO 2006 1-2 (2006), available at <http://www.monsanto.com/monsanto/content/investor/financial/reports/2006/Q42006Acreage.pdf>.

agreements restricting the use of seeds to one generation.² Some farmers, however, have used generation after generation of seed in violation of these licensing agreements.³ To enforce their patent rights, Monsanto began investigating farmers and suing alleged infringers.⁴

In *Monsanto Co. v. Scruggs*, the United States Court of Appeals for the Federal Circuit affirmed a grant of Monsanto's motion for summary judgment against an alleged infringer, Scruggs.⁵ Rejecting Scruggs' first sale doctrine defense among others,⁶ the court followed its decision in *Monsanto Co. v. McFarling* by holding that subsequent generations of seed fall within the scope of Monsanto's patents.⁷ The *Scruggs* court noted that, "[a]pplying the first sale doctrine to subsequent generations of self-replicating technology would eviscerate the rights of the patent holder."⁸

These rulings provide inventors of self-replicating technology the legal protection necessary to make a return on their costs of invention while enabling the diffusion of current innovations and promoting future innovation. Eliminating Monsanto's patent rights through the first sale doctrine would have significantly diminished incentives for investing in self-replicating technology and likely encouraged innovation in genetic use restriction technologies that prevent seed from self-replicating. A comparative look at the history of contract licensing and the rise of technological protection measures in copyright reveals the possible negative impacts of denying patent protection for next-generation seed.

This Note focuses on economic rationales underlying the Federal Circuit's decisions in *Scruggs* and *McFarling*. Part I provides pertinent background information on Monsanto's patented seed technology, relevant economic theory, and a historical account of the first-sale doctrine. Part II provides background information about the parties involved in these cases

2. *Monsanto Co. v. McFarling (McFarling II)*, 363 F.3d 1336, 1339 (Fed. Cir. 2004).

3. *Id.*; *Monsanto Co. v. Scruggs*, 459 F.3d 1328, 1333 (Fed. Cir. 2006).

4. *Scruggs*, 459 F.3d at 1333; see also THE CENTER FOR FOOD SAFETY, *Seizing Control: Monsanto's Path to Domination of Biotech Crops and U.S. Agriculture*, in *MONSANTO V. U.S. FARMERS 23-24* (2005), available at <http://www.centerforfoodsafety.org/pubs/CFSMonsantovsFarmerReport1.13.05.pdf>.

5. *Scruggs*, 459 F.3d at 1332.

6. *Id.* at 1332-36. Scruggs also argued that Monsanto's patent claims did not read on its plants, that Monsanto's test results showing that Scruggs' soybean and cotton crops contained Monsanto's Roundup Ready® and Bollgard technology should be disregarded, and that Scruggs had an implied license. *Id.* at 1335.

7. See *id.* at 1336 (citing *Monsanto Co. v. McFarling (McFarling I)*, 302 F.3d 1291, 1299 (Fed. Cir. 2002)).

8. *Scruggs*, 459 F.3d at 1336.

and discusses the Federal Circuit's holdings. Lastly, Part III proposes that the Federal Circuit's refusal to apply the first sale doctrine was appropriate and explains how economic rationales support this holding. The Note concludes with a cautionary look at the possible ramifications if the court had not extended patent protection to self-replicating technology in the agriculture industry.

I. SELF-REPLICATING TECHNOLOGY: THE SCIENCE AND THE LAW

Monsanto's herb- and insect-resistant seed technology raises a number of issues that lie at the nexus of economics and law. How much patent protection is necessary to enable the inventor to make a return on his investment? Will overly broad patent protection discourage the diffusion of current innovations and development of future innovation? Should patent law protect subsequent generations of self-replicating technology to the same degree that it protects the first generation? Each of these questions requires a deeper understanding of the technology at issue, the economics involved, and the role of the first sale/patent exhaustion doctrine in sales of patented products.

A. Monsanto and Seed Technology

One of Monsanto's best selling products is the Roundup® line of herbicides.⁹ Roundup® herbicides contain an active chemical ingredient glyphosate, which indiscriminately kills vegetation by inhibiting the metabolic activity of 5-enolpyruvylshikimate-3-phosphate synthase ("EPSPS"), an enzyme necessary for plant growth.¹⁰ EPSPS plays a critical role in the conversion of sugars into amino acids needed for growth in many plants and weeds.¹¹ Although highly effective at eliminating most weeds, glyphosate is non-selective and can cause severe crop damage if sprayed "over-the-top" of crops.¹² To increase the use of Roundup® herbicide in the agricultural market without damaging crops, Monsanto developed recombinant-DNA technology to protect crops from glyphosate.¹³

9. Brief of Appellee Monsanto Company at 2, *Monsanto Co. v. Scruggs*, 459 F.3d 1328 (Fed. Cir. 2006) (No. 04-1532) [hereinafter Brief of Appellee Monsanto in *Scruggs*].

10. *Id.*

11. *McFarling II*, 363 F.3d 1336, 1338 (Fed. Cir. 2004).

12. Brief of Appellee Monsanto in *Scruggs*, *supra* note 9, at 2.

13. *Id.* at 3.

These advances involve inserting a modified EPSPS gene into crop seeds to confer glyphosate-resistance to plants grown using the seed.¹⁴ Monsanto's U.S. Patent Nos. 5,633,435 ("the '435 patent") and 5,352,605 ("the '605 patent") cover this technology.¹⁵ The '435 patent relates to the gene encoding the modified EPSPS enzyme and the "isolated DNA molecule" encoding it, "[a] glyphosate-tolerant plant cell comprising" that DNA molecule, "[a] glyphosate-tolerant plant comprising" that plant cell, "[a] seed of a glyphosate-tolerant plant," a particular "transgenic soybean plant," and "[a] method of producing genetically transformed plants which are tolerant toward glyphosate herbicide."¹⁶ The '605 patent covers insertion of a synthetic gene consisting of a 35s cauliflower mosaic virus ("CaMV") promoter, a protein sequence of interest, and a stop signal, into plant DNA to create herbicide resistance.¹⁷ Monsanto used the technology in the '435 and '605 patents to develop glyphosate herbicide-resistant soybeans and cotton, sold as Roundup Ready® soybeans and cotton.¹⁸ Farmers can spray fields planted with Roundup Ready® seed with Roundup® and other glyphosate-based herbicides to kill weeds without harming the crop plants.¹⁹

Monsanto also developed seed technology to protect cotton plants from pests like bollworms and moth larvae.²⁰ This technology falls under three of Monsanto's patents, U.S. Patent Nos. 5,164,316, 5,196,525, and 5,322,938 (collectively "the McPherson Patents").²¹ Similar to the glyphosate-resistant technology, this technology includes the insertion of a foreign gene into the plant DNA.²² This gene, derived from the bacterium *Bacillus thuringiensis* (the "Bt gene"), causes a plant to produce an enzyme toxic to insects, thus allowing farmers to protect cotton plants from pests while reducing or eliminating the need for pesticides.²³ Monsanto markets seed containing the Bt gene as Bollgard® Cotton.²⁴ In addition, it

14. *Id.* The modified EPSPS gene codes for a variant EPSPS that is not affected by glyphosate but still performs the sugar-conversion function required for plant growth. *McFarling II*, 363 F.3d at 1338. Thus, while the seed produce both the "natural" and variant forms of EPSPS, glyphosate only inactivates the "natural" EPSPS enzyme, allowing the variant EPSPS to continue to enable normal plant growth. *Id.*

15. *McFarling II*, 363 F.3d at 1338-39.

16. U.S. Patent No. 5,633,435 (filed Sept. 13, 1994).

17. *Monsanto Co. v. Scruggs*, 459 F.3d 1328, 1332 (Fed. Cir. 2006).

18. *See id.*; *McFarling II*, 363 F.3d at 1339.

19. Brief of Appellee Monsanto in *Scruggs*, *supra* note 9, at 3.

20. *Id.*

21. *Id.* at 3-4.

22. *Id.* at 4.

23. *Id.* at 3.

24. *Id.*

markets seeds containing both Roundup Ready® and Bollgard traits (known as “stacked trait” cotton).²⁵

While Monsanto owns several subsidiaries that produce seeds, it also provides competing producers with access to its technology.²⁶ Monsanto began licensing its Roundup Ready® technology to seed companies in 1996, followed by the Bollgard/Roundup Ready® cotton technology in 1998.²⁷ Through a two-tiered licensing scheme, Monsanto licenses the patented genes to seed companies that manufacture glyphosate-tolerant seeds and requires that those seed companies execute licenses, rather than conduct unconditional sales, with their customers.²⁸ Under the first licensing tier, Monsanto licenses more than 200 seed companies to incorporate the patented traits into their own germplasm²⁹ to produce glyphosate-tolerant and insect-resistant cotton and soybean seeds.³⁰ In return, Monsanto receives a royalty, or “technology fee,” of \$6.50 for every 50-pound bag of applicable seed sold by the seed company.³¹ Under the second licensing tier, Monsanto places several conditions on the end users’—the farmers’—use of licensed seed. For the right to use the Roundup Ready® technology, the farmer signs a “Technology Agreement” and agrees “[t]o use the seed containing Monsanto gene technologies for planting a commercial crop only in a single season,” and “to not save any crop produced from this seed for replanting, or supply saved seed to anyone for replanting.”³²

B. Limitations on Patent Rights: Economic Theory and The First Sale & Patent Exhaustion Doctrine

The purpose of patent law is “to promote the Progress of Science and useful Arts.”³³ Among the several economic theories developed to explain how patents promote technological progress,³⁴ the incentive-to-invent

25. *Id.*

26. *Id.* at 5.

27. *Monsanto Co. v. Scruggs*, 459 F.3d 1328, 1333 (Fed. Cir. 2006).

28. *See Monsanto Co. v. McFarling (McFarling I)*, 363 F.3d 1336, 1339 (Fed. Cir. 2004).

29. The germplasm can differ among seed companies

30. Brief of Appellee Monsanto in *Scruggs*, *supra* note 9, at 5.

31. *McFarling II*, 363 F.3d at 1339.

32. *Id.*

33. U.S. CONST. art. I, § 8, cl. 8.

34. Those economic theories include: the Incentive-to-Disclose Theory, which states that without patent protection, inventors would conceal their inventions in order to prevent exploitation by competitors; the Incentive-to-Innovate/Schumpeterian Theory, which states that patent monopoly promotes innovation and growth more effectively than pure competition; and the Prospect Theory, which holds that patents promote efficient development of patented inventions by allowing patent owners to coordinate further research

theory recognizes that an inventor requires compensation for investing in R & D.³⁵ This theory proposes that the inventor earns compensation for his invention through patent protection, which provides him with the exclusive right to make, use, and sell his invention for a limited period of time.³⁶ Absent such protection, free-riders who do not bear the costs of R & D, could quickly copy the invention and capitalize on the inventor's work. Competition between the inventor and subsequent free-riders would cause the price of the invention to fall to marginal costs at which the inventor could only recover manufacturing costs and not his original investment. Faced with such outcomes, inventors would have little incentive to invest in future R & D, thus delaying the release of socially beneficial inventions and perhaps preventing them entirely.

Overly broad patent protection, however, hinders the diffusion of current innovations and the development of future innovation.³⁷ Intellectual property recognizes two primary types of innovation, stand-alone and cumulative.³⁸ Stand-alone innovation comprises a very narrow class of inventions, which do not ultimately generate follow-on innovation.³⁹ In contrast, cumulative innovation includes a broader class of inventions where each invention lays a foundation for future innovations.⁴⁰ Since secondary inventions, including essential design improvements, refinements, and adaptations to various uses, often play as great a role in providing social benefits as the initial discovery,⁴¹ patent law must protect the diffusion of current innovations and the development of future innovation by enabling follow-on inventors to secure rights on improvements and build upon innovations in their entirety within a relatively short period of time.⁴²

While the length of patent protection affects the overall level of profit, the statutory duration of protection may be irrelevant.⁴³ Market incumben-

and development efforts. *See generally* Yusing Ko, *An Economic Analysis of Biotechnology Patent Protection*, 102 YALE L.J. 777 (1992).

35. *See id.* at 791-92.

36. 35 U.S.C. § 154 (1988); *see* 35 U.S.C. § 271(a) (2003).

37. Peter Menell & Suzanne Scotchmer, *Intellectual Property*, in HANDBOOK OF LAW AND ECONOMICS (A. Mitchell Polinsky & Steven Shavell, eds.) (forthcoming 2007) (manuscript at 4-5, on file with author).

38. *Id.* at 7.

39. *Id.* at 8. Stand-alone innovation includes the safety razor, ballpoint pen, and pharmaceutical innovation for which the scientific mechanism is poorly understood. *Id.*

40. *Id.* at 7. Cumulative innovation includes automobiles, computers, and innovation in the biotechnology field. *Id.* at 24.

41. *Id.* at 23-24.

42. *Id.* at 6, 23-24.

43. *Id.* at 26.

cy only lasts until innovations are supplanted by improvements.⁴⁴ Therefore, “the effective life of the patent may be determined by the breadth of the right, rather than its statutory length” because the “breadth determines how long it will take before the product is supplanted.”⁴⁵ In the patent context, a patent’s claims, which define the boundaries of the property right, determine the breadth.⁴⁶ Broader claims preempt more innovation and thus provide greater economic returns than narrow ones.⁴⁷ A patentee, however, can only prohibit competitors if the patents claims remain enforceable. Intellectual property law recognizes a number of means for eliminating an inventor’s rights to exclusivity, including the first sale/patent exhaustion doctrine.⁴⁸

The first sale/patent exhaustion doctrine provides that the unrestricted first sale by a patentee of his patented product exhausts patent rights to that specific product.⁴⁹ As a result, the initial purchaser of a product may use or resell the product free of control or conditions imposed by the patent owner.⁵⁰ However, if a purchaser only acquires a limited interest from the patent holder, the purchaser risks infringement by exceeding this limitation.⁵¹

In *Adams v. Burke*, the Supreme Court held that “when the patentee, or the person having his rights, sells a machine or instrument whose sole val-

44. *Id.*

45. *Id.* at 26-28.

46. *Id.* at 15.

47. See *Ko*, *supra* note 34, at 2, 8.

48. See *Menell & Scotchmer*, *supra* note 37, at 19-20.

49. See *LG Elecs., Inc. v. Bizcom Elecs., Inc.*, 453 F.3d 1364, 1369-70 (Fed. Cir. 2006); see also *Mallinckrodt, Inc. v. Medipart, Inc.*, 976 F.2d 700, 706 (Fed. Cir. 1992).

50. See, e.g., *Intel Corp. v. ULSI Sys. Tech. Corp.*, 995 F.2d 1566, 1568 (Fed. Cir. 1993) (“The law is well settled that an authorized sale of a patented product places that product beyond the reach of the patent [.]”); see also *Brandt Consol. Inc. v. Agrimar Corp.*, 801 F. Supp. 164, 173 (C.D. Ill. 1992). The *Brandt* court stated that

An incident to the purchase of any article, whether patented or unpatented, is the right to use and sell it. The purpose of the patent law is thus fulfilled with respect to any particular article once the patentee has received the reward for the use of his invention by selling the article. Once that purpose is realized, the patent law affords no basis for restraining the use and enjoyment of the thing sold.

801 F. Supp. at 173.; see also *Duplan Corp. v. Deering Milliken, Inc.*, 444 F. Supp. 648, 757 (D.S.C. 1977) (“[A] patentee who manufactures and sells a patented product without an express reservation of use rights impliedly conveys to the purchaser the right to full and unrestricted use of the product.”), *aff’d*, 594 F.2d 979 (4th Cir. 1979).

51. *Kendall Co. v. Progressive Med. Tech., Inc.*, 85 F.3d 1570, 1576 (Fed. Cir. 1996) (“[B]reach of an enforceable condition of sale or license may leave the breaching party open to a claim for patent infringement.”).

ue is in its use, he receives the consideration for its use and he parts with the right to restrict that use. The article . . . passes without the limit of the monopoly."⁵² While the purchaser's right to use or sell the product includes a right to make repairs, it does not include the right to make or reconstruct a new product.⁵³

A patentee, however, may limit exhaustion and restrict resale by imposing express conditions on sales of the patented product. In *General Talking Pictures Corp. v. Western Electric Co.*,⁵⁴ the patent owner issued a license "expressly confined to the right to manufacture and sell the patented amplifiers for radio amateur reception, radio experimental reception, and home broadcast reception."⁵⁵ A licensee, however, knowingly sold patented amplifiers for use in a field prohibited by the license.⁵⁶ The Court held that a defendant who purchased amplifiers from the licensee infringed the patent because he made purchases with actual knowledge of the original license restrictions at the time of purchase.⁵⁷ Therefore, where a patent owner licenses a manufacturer to make his patented invention, the patent owner may restrict that manufacturing licensee's use of the invention and enforce the restriction under the patent laws.⁵⁸

Subsequently, the Federal Circuit reaffirmed the limitations of the exhaustion doctrine in *Mallinckrodt Inc. v. Medipart*.⁵⁹ The court overturned the district court, which had held that a "restriction on reuse was, as a matter of law, unenforceable under the patent law."⁶⁰ The Federal Circuit found that the district court incorrectly relied on the basic principle that a first unconditional sale of a patented device exhausts the patentee's right to control subsequent use of the device.⁶¹ The Federal Circuit clarified that "[t]he principle of exhaustion of the patent right [does] not turn a conditional sale into an unconditional one."⁶² Reviewing *Adams* and its progeny, the court noted that in early cases the Supreme Court "simply applied, to a variety of factual situations, the rule of contract law that sale may be

52. *Adams v. Burke*, 84 U.S. 453, 456 (1873).

53. See generally *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 346 (1961).

54. *Gen. Talking Pictures Corp. v. W. Elec. Co.*, 304 U.S. 175, 180, *aff'd on reh'g*, 305 U.S. 124 (1938).

55. *Id.* at 180.

56. *Id.* at 179-80.

57. *Id.* at 180-82.

58. See *Mallinckrodt, Inc. v. Medipart, Inc.*, 976 F.2d 700, 706-08 (Fed. Cir. 1992).

59. *Id.* at 706-08.

60. *Id.* at 703-04.

61. *Id.* at 706.

62. *Id.*

conditioned.”⁶³ As a result, the cases “do not stand for the proposition that no restriction or condition may be placed upon the sale of a patented article. . . . Unless the condition violates some other law or policy (in the patent field, notably the misuse or antitrust law).”⁶⁴ The court held that private parties retain the freedom to contract concerning conditions of sale.⁶⁵

More recently, in *B. Braun Medical, Inc. v. Abbott Laboratories*, the Federal Circuit followed *Mallinckrodt* but noted that patent misuse places limitations on restrictive licenses.⁶⁶ The Federal Circuit held that the patent exhaustion doctrine does not apply to an expressly conditional sale or license and that in such a transaction, “it is more reasonable to infer that the parties negotiated a price that reflects only the value of the ‘use’ rights conferred by the patentee.”⁶⁷ However, a patentee may not impose the condition to impermissibly broaden the physical or temporal scope of the patent grant with anticompetitive effect.⁶⁸ Such a broadening constitutes patent misuse.⁶⁹

These principles of patent exhaustion have played a significant role in the plant breeding industry, notably in “seed bag tags,” a form of “shrink-wrap” license under which the purchaser agrees to specific provisions written on the bag upon opening the product.⁷⁰ Recently, however, a more difficult issue of whether or not patent exhaustion applies to the second generation of seeds purchased by consumers arose before the Federal Circuit in two cases, *Monsanto Co. v. McFarling* and the subsequent case *Monsanto Co. v. Scruggs*.

II. MONSANTO, SCRUGGS, AND MCFARLING

The plaintiff in both lawsuits, Monsanto, is one of the largest agricultural/chemical companies in the United States, with revenues approaching

63. *Id.* at 708.

64. *Id.*

65. *Id.*

66. 124 F.3d 1419, 1426 (Fed. Cir. 1997).

67. *Id.* at 1426.

68. *Id.* at 1427.

69. *Id.* at 1426.

70. In *Pioneer Hi-Bred International, Inc. v. Ottawa Plant Food, Inc.*, 283 F. Supp. 2d 1018, 1031-33 (N.D. Iowa 2003), Ottawa sought to invoke patent restrictions that were inconsistent with Ottawa’s claim of exhaustion. The court held that the seed bag tag provisions operated as conditions on the sale of seed that overrode the general principal of exhaustion. *Id.* at 1033-34.

\$6.5 billion in 2005.⁷¹ Monsanto develops, manufactures, licenses, and sells a variety of agricultural biochemistry and agricultural chemical products, including the world's best-selling herbicide Roundup®. Monsanto also develops, manufactures, licenses, and sells genetically modified seed technology.⁷²

The defendants in both *McFarling* and *Scruggs* are farmers. The defendant in *McFarling*, Honan McFarling, operates a 5,000-acre farm in Pontotoc, Mississippi.⁷³ Defendants Mitchell Scruggs, Eddie Scruggs, Scruggs Farm & Supplies, LLC, Scruggs Farm Joint Venture, HES Farms, Inc., MES Farms, Inc., and MHS Farms, Inc. (collectively "Scruggs"), run farms and a farm supply company in Mississippi, selling a variety of agricultural related products.⁷⁴

In 1997 and 1998, McFarling purchased Roundup Ready® soybean seed, signed the Technology Agreement, and paid the license fee for each purchase.⁷⁵ In violation of the agreement, McFarling saved 1,500 bushels of the patented soybean from his harvest during one season and planted them as seed in the next season.⁷⁶ The following year, McFarling saved 3,075 bags of soybean from his crop and subsequently planted them.⁷⁷ In January 2000, Monsanto sued McFarling for patent infringement and breach of contract.⁷⁸

As one of several defenses, McFarling argued that Monsanto's contractual prohibition against replanting the patented seeds violated the first sale doctrine.⁷⁹ The district court, however, rejected McFarling's defenses, and granted Monsanto's motions for summary judgment on the infringement of the '605 patent and the breach of the Technology Agreement claim.⁸⁰ McFarling appealed to the Federal Circuit.⁸¹ The Federal Circuit,

71. Headquartered in St. Louis, Missouri, Monsanto ranks 336 out of 500 on the Fortune 500 list of America's largest corporations and the twelfth largest chemical company on the same list. *See Fortune 500 2006: Monsanto*, CNNMONEY.COM, Apr. 17, 2006, <http://money.cnn.com/magazines/fortune/fortune500/snapshots/3779.html>.

72. *See id.*; Monsanto, Who We Are, http://www.monsanto.com/monsanto/layout/about_us/default.asp (last visited Mar. 5, 2007).

73. *Monsanto Co. v. McFarling (McFarling II)*, 363 F.3d 1336, 1339 (Fed. Cir. 2004).

74. *Monsanto Co. v. Scruggs*, 459 F.3d 1328, 1332 (Fed. Cir. 2006).

75. *Monsanto Co. v. McFarling (McFarling I)*, 302 F.3d 1291, 1293 (Fed. Cir. 2002).

76. *Id.*

77. *McFarling II*, 363 F.3d at 1339.

78. *McFarling I*, 302 F.3d at 1294.

79. *Id.* at 1297. McFarling's other defenses included antitrust violation, patent misuse, and violation of the Plant Variety Protection Act. *Id.* at 1294

80. *McFarling II*, 363 F.3d at 1341.

however, rejected McFarling's patent exhaustion and other defenses, holding that "[t]he 'first sale' doctrine of exhaustion of the patent right is not implicated, as the new seeds grown from the original batch had never been sold."⁸² In addition, the court held that not only did Monsanto's '435 patent read on the first generation seeds, "it also read[] on the second generation seeds."⁸³

On September 7, 2000—less than a year after filing suit against McFarling—Monsanto sued Scruggs in the United States District Court for the Northern District of Mississippi for the infringement of the Roundup Ready® patents.⁸⁴ Scruggs had purchased both Roundup Ready® soybean seed and Bollgard/Roundup Ready® cotton seed.⁸⁵ Like McFarling, Scruggs planted the patented seed, retained the new generation of seed, and planted them.⁸⁶

Unlike McFarling, however, Scruggs never signed a licensing agreement.⁸⁷ Although the '605 patent, which relates to the use of genetically modified plant cells, was at issue in both cases, the '435 patent was only at issue in *McFarling*.⁸⁸ Additionally, *Scruggs* pertained to a family patents, the McPherson patents, which claim methods for conferring insect-resistance.⁸⁹ In the district court, Scruggs raised several affirmative defenses including patent exhaustion.⁹⁰ Following discovery, however, the court granted Monsanto's motions for summary judgment.⁹¹ The district court held that Scruggs had indeed infringed Monsanto's patents, rejecting Scruggs' patent exhaustion defense because Monsanto had never made an unrestricted sale of its patented biotechnology despite the fact Scruggs had never signed a licensing agreement.⁹²

Scruggs' appealed the grant of summary judgment to the Federal Circuit.⁹³ The Federal Circuit affirmed, agreeing that the doctrine of patent exhaustion was inapplicable because there was no unrestricted first sale.⁹⁴

81. *Id.*

82. *McFarling I*, 302 F.3d at 1299.

83. *McFarling II*, 363 F.3d at 1343.

84. Brief of Appellee Monsanto in *Scruggs*, *supra* note 9, at 1.

85. *Monsanto Co. v. Scruggs*, 459 F.3d 1328, 1333 (Fed. Cir. 2006).

86. *Id.*

87. *Id.*

88. *Id.*; *McFarling II*, 363 F.3d at 1340.

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

90. *Id.* at 1333-34.

91. *Id.* at 1333.

92. *Id.* at 1334.

93. *Id.* at 1332.

94. *Id.* at 1336.

The sale was restricted because the use of seeds by seed growers was conditioned on obtaining a license from Monsanto. Additionally, the court took the position that the next generation of seed produced by the initial purchased seed were entirely new seed.⁹⁵ Thus, the court repeated that the “‘first sale’ doctrine of exhaustion of the patent right is not implicated, as the new seeds grown from the original batch had never been sold.”⁹⁶ Most importantly, “[t]he fact that a patented technology can replicate itself does not give a purchaser the right to use replicated copies of the technology.”⁹⁷ The court recognized that “[a]pplying the first sale doctrine to subsequent generations of self-replicating technology would eviscerate the rights of the patent holder.”⁹⁸ The court’s decision in *Scruggs* reiterated the Federal Circuit’s ruling on self-replicating technology previously established in *McFarling*.⁹⁹

III. NEGATIVE IMPLICATIONS FOR PATENT EXHAUSTION AND SELF-REPLICATING TECHNOLOGY

In *McFarling* and *Scruggs*, the Federal Circuit held that Monsanto’s patents covered future generations of seed along with the initial seed.¹⁰⁰ Alternatively, the court could have held that either the first sale doctrine eliminated Monsanto’s rights to the next generation seed produced, or that *Scruggs* and *McFarling* had violated Monsanto’s licensing provisions even if the patent did not cover the second generation seed. Of the three possibilities, however, the court’s decision provides the optimal protection necessary for economic incentives to motivate investment in R & D while balancing the diffusion of current innovations and the development of future innovation. A Federal Circuit holding that patent exhaustion eliminated Monsanto’s rights to future generations of seed would have significantly harmed incentives for investment in self-replicating technology and likely encouraged the use of genetic restriction technologies, thus shifting control of intellectual property rights out of the hands of the public and into the hands of private entities.

95. *Id.*

96. *Id.* (quoting *Monsanto Co. v. McFarling (McFarling I)*, 302 F.3d 1291, 1299 (Fed. Cir. 2002)).

97. *Scruggs*, 459 F.3d at 1336.

98. *Id.*

99. *Id.*

100. *See id.*; *McFarling I*, 302 F.3d at 1298-99.

A. Patent Exhaustion Could Impede the Innovation in Self-Replicating Technology

A Federal Circuit ruling that the first sale doctrine exhausted Monsanto's rights in subsequent generations of seeds would have negatively impacted incentives for investment in self-replicating technology. Without some control over the invention after the sale, selling genetically engineered seed would "amount to handing over the keys to the factory."¹⁰¹ Every purchaser could immediately go into direct competition with the inventor.¹⁰² As a result, the inventor would risk the patent monopoly at the first and each subsequent sale. He would be left without a reasonable patent term to recoup his costs of creation and could not earn a profit to compensate for the risk of investment.¹⁰³ No longer being able to recover the immense development costs accrued during the production of the technology incrementally through sales to a large number of small enterprises, the inventor would have to recoup the development costs in one or a few large sales, thereby greatly reducing the potential market.¹⁰⁴ As a result, the small farmer, unable to pay the higher costs, could not obtain the improved varieties of seed and would have to compete from a technologically inferior position.¹⁰⁵

Additionally, in the instant cases there are more players involved in the transaction than just the farmers and the inventor. Monsanto licenses its technology to numerous seed producers who combine Monsanto's genetic technology with seed having traits obtained through their own breeding programs.¹⁰⁶ These seed companies spend substantial amounts of money annually in the development and testing of improved soybean and cotton varieties.¹⁰⁷ Cotton varieties, specifically, are bred to have a combination of desirable traits such as increased yield, stress resistance, and improved

101. See Scott A. Chambers, *Exhaustion Doctrine in Biotechnology*, 35 IDEA 289, 319 (1995).

102. See *id.*

103. *Id.*

104. *Id.*

105. *Id.*

106. Brief of Appellee Monsanto in *Scruggs*, *supra* note 9, at 5.

107. See Brief for Delta & Pine Land Company as Amicus Curiae, at 2, *Monsanto Co. v. Scruggs*, 459 F.3d 1328 (Fed. Cir. 2006) (No. 04-1532). In the United States, commercial planting seed may be certified according to Standard Seed Certification Program as outlined by the Association of State Certifying Agencies (AOSCA) and as regulated by the Federal Seed Regulations. Producing certified seed requires specific land conditions, the use of planting eligible seed stock, and meeting standards based on laboratory analysis. All of these elements encompass the investments seed producers must make. *Id.* at 12.

fiber quality.¹⁰⁸ Seed growers protect their investments by obtaining Plant Variety Protection certificates and, more recently, utility patents for those newly developed varieties.¹⁰⁹

Removing protection from the next generation of seed would diminish the incentives for seed growers to incorporate Monsanto's technology into their products. If a purchaser of self-replicating technology immediately becomes a producer, he avoids costs associated with initially incorporating Monsanto's technology into the seeds and producing the new varieties. As a result, fewer seed companies would be willing to devote the resources for incorporating Monsanto's technologies, thereby increasing the transaction costs for Monsanto to license its seed technology to independent seed producers. Monsanto would have to incur the additional costs of production.

Despite these economic arguments against broadening the first sale doctrine, McFarling and others argued that prohibiting farmers from saving and replanting their own seed destroys a "secondary market," which would cause an artificially high price for Roundup Ready® seed.¹¹⁰ McFarling noted that a farmer who buys a new bag of Roundup Ready® seed pays both a \$6.50 per bag technology fee for Monsanto's technology and approximately \$18.00¹¹¹ per fifty-pound bag for a total approximate price of \$24.00.¹¹² On the other hand, if a farmer could save his seed, he would only invest about \$7.00 per bag.¹¹³ Citing an agricultural economist, McFarling argued that "[p]rohibiting a farmer from saving and replanting his own seed causes the market to be inefficient and results in higher prices for new seed."¹¹⁴

While it is true that limiting the doctrine of patent exhaustion and prohibiting seed saving leads to higher prices, this economic argument focuses exclusively on the economic position of the farmer and completely ignores the larger economic framework in which many other parties play a role. While it may be beneficial in the short-term for the farmer to exact the most profits from his crops by means of saving seed, Monsanto and similar companies need the broader scope of rights to profit from their investment. Otherwise, they will not make these types of investments in the

108. *Id.* at 2.

109. *Id.* at 3.

110. Corrected Brief of Appellant at 7, *Monsanto Co. v. McFarling*, 363 F.3d 1336 (Fed. Cir. 2004) (No. 03-1177).

111. This amount can vary as much as \$2.00 per bag. *Id.* at 6.

112. *Id.* at 5-6.

113. *Id.* at 6.

114. *Id.* at 7.

first place and farmers will be unable to profit from the long-term benefits being offered by these new technologies.

In addition, if the prohibition on saving seed was as economically inefficient as McFarling claimed, farmers would not purchase Roundup Ready® seed. Farmers do, however, purchase the seed and abide by the licensing agreements.¹¹⁵ While the initial costs of Roundup Ready® seed are higher for farmers, farmers make other economic gains in the form of reduced labor for pest and weed control as well as improved crop yields. The use of Roundup Ready® seed allows fewer herbicide applications and the use of fewer types of herbicide, leading to reduced time in the field and lower labor costs, and affords more flexibility to rotate crops grown depending on market conditions.¹¹⁶ Some farmers note cleaner fields and greater and higher quality yields because of decreased crop damage from weeds and/or certain herbicides when using Roundup Ready® seeds.¹¹⁷ Therefore, McFarling's arguments about inefficiency are not so much about the system as a whole being economically inefficient as they are about individual farmers achieving the greatest short-term gains that they can at the expense of others.

Finally, without effective patent laws protecting self-replicating technologies, innovators will be pushed towards pursuing innovations that eliminate the self-replicating characteristics of this technology. As a result, inventors will have sole control of the technologies and the resulting innovation will be outside the regulation of patent laws. This scenario marks the second possible negative outcome had the Federal Circuit failed to protect subsequent generations of Monsanto's seed technology.

B. Technological Protections for Seed Innovation

The history of content licensing for digital media may offer a glimpse into what the future may hold for self-replicating technologies if the technologies are not adequately protected. Similar to the self-replicating technology at issue, ideas, books, music, and other valuable creative or expressive works may be costly to create, but nearly costless to duplicate and disperse. Just as innovators in the digital media industry worked to maintain a return on their investment through technological "lock out" measures, innovators working with self-replicating biotechnology may adopt similar measures if faced with inadequate legal protection.

115. See, e.g., Corrected Brief of Shea Leatherman d/b/a Riverfield Farms as Amicus Curiae in Support of Plaintiff-Appellee at 1-2, *Monsanto Co. v. Scruggs*, 459 F.3d 1328 (Fed. Cir. 2006) (No. 04-1532).

116. *Id.* at 5-6.

117. *Id.* at 5.

Recent technological innovations have facilitated the infringement of copyrighted works, such as software, music, pictures and movies, by providing simple, fast, and inexpensive ways to duplicate these works.¹¹⁸ Initially, the enormous informational magnitude of music, film, and complex software coupled with limited microprocessor power, low fidelity of computer peripherals, and limitations of memory storage capacity prevented these works from being stored, perceived, and reproduced efficiently on computer devices.¹¹⁹ By the late 1980s and early 1990s, technological advances improved the capability and reduced the cost of computing.¹²⁰ Quickly, computers became an attractive platform for videogames, multimedia content, and music.¹²¹ These included developments in hardware and network technology, data compression technologies, a new wave of consumer electronics, the development of broadband access for internet home users, and the development of peer-to-peer file sharing networks.¹²²

One such development, the peer-to-peer file sharing network, offers an example of how modern technological inventions immediately increased unlawful duplication and distribution of copyrighted works. From their inception, peer-to-peer technology enabled sharing audio and video files converted or extracted from copyrighted media.¹²³ While this initially led to a limited number of problems when few used the networks, piracy became rampant as the number of peer-to-peer end-users and the number of technological options for file-sharing increased.¹²⁴ Today, the Recording Industry Association of America estimates that computer users illegally download more than 2.6 billion copyrighted files, mostly songs, every month.¹²⁵ Despite efforts to counteract such illegal downloading, the music industry loses millions of dollars in sales to online piracy.¹²⁶

In response to growing piracy, a number of content industries such as the music industry began resisting the introduction of digital technologies

118. Peter S. Menell, *Envisioning Copyright Law's Digital Future*, 46 N.Y.L. SCH. L. REV. 63, 66, 98-99, 103, 107, 114 (2002-03).

119. *Id.* at 66, 99, 110.

120. *Id.* at 66, 99.

121. *Id.*

122. *Id.* at 66, 110.

123. See Robert A. Heverly, *The Information Semicommons*, 18 BERKELEY TECH. L.J. 1127, 1135 (2003).

124. *Id.* at 1136.

125. See Recording Industry Association of America (RIAA), *Some Facts About Music Piracy*, June 5, 2003, http://www.riaa.com/news/newsletter/062503_c.asp.

126. See *Illegal Downloads Grow Despite Lawsuits*, CNNMONEY.COM, Feb. 8, 2007, http://money.cnn.com/2007/02/08/technology/personaltech/piracy_lawsuit.reut/index.htm?postversion=2007020812.

through litigation.¹²⁷ Meanwhile, the software industry's response was to adopt "shrink-wrap" and "click-wrap" licenses to limit consumers' uses of a product including duplication and distribution.¹²⁸ "Shrink-wrap" and "click-wrap" licenses take their names from the practice of a purchaser accepting licensing terms by breaking the shrink-wrap cellophane on the product package or using a computer mouse to click on a graphic labeled "I agree."¹²⁹ Despite the increased prevalence of lawsuits to enforce these licenses, content industries experienced extreme difficulties in policing such agreements.¹³⁰

As a result, content industries turned to encryption and digital rights management (DRM) as an essential means of protecting content in the on-line marketplace.¹³¹ These sophisticated lock-out systems allow owners to dictate the terms of access to digitized content.¹³² In addition, they govern a wide range of user behavior, such as the number of times a work may be accessed, the duration of access, the ability to reproduce or transmit the work, and the payment schedule for additional access.¹³³

In the agricultural industry, Monsanto faces an analogous problem to that of copyright holders in protecting its intellectual property. Just as modern technological advancements in computer technology enable the inexpensive duplication of copyrighted media, the self-replicating nature of seed provides farmers with an inexpensive means of duplicating Monsanto's patented technology. To protect its intellectual property and thus recoup its development costs, Monsanto initially used "seed bag tag" licenses similar to the "shrink-wrap" and "click-wrap" licenses used by the software industry. Shortly thereafter, Monsanto began suing infringing farmers like McFarling and Scruggs, just as the music industry had done with file sharers on peer-to-peer networks.¹³⁴ Unlike copyright holders, however, Monsanto has yet to utilize technological constraints akin to DRM to limit the use of its seeds. While such technological controls may

127. See RIAA, Issues: What the RIAA is Doing About Piracy, <http://www.riaa.com/issues/piracy/riaa.asp> (last visited Feb. 27, 2007) [hereinafter RIAA Issues]. The RIAA has gone beyond suing the peer-to-peer networks themselves to suing individual downloaders. See *id.*

128. See Dan L. Burk, *DNA Rules: Legal and Conceptual Implications of Biological "Lock-Out" Systems*, 92 CALIF. L. REV. 1553, 1561 (2004).

129. *Id.*

130. See *id.* at 1563.

131. Menell, *supra* note 118, at 129-38.

132. See Burk, *supra* note 128, at 1563.

133. *Id.*

134. See RIAA Issues, *supra* note 127.

not have been available to Monsanto a number of years ago, recent advances could soon make these protection measures a reality.¹³⁵

Biotechnology, like software, now permits technological constraints to be purposefully programmed into genetic code. The recent development of transgenic technologies called genetic use restriction technologies (GURTs) allows for self-policing seeds.¹³⁶ These technologies function by introducing genetic elements into the plants which produce a toxin late in seed maturation.¹³⁷ The toxin kills the seed after the plant has matured, producing a safe but sterile crop for the farmer, forcing him to purchase new seeds each year because the seeds produced in growing the crop are not viable for replanting.¹³⁸ Like software, a genetically altered seed carries within its own make-up a “lock out” prohibition on unlicensed use.

The recent appearance of GURTs bears a striking resemblance to the history of content licensing in digital media.¹³⁹ Recognizing that DRM technologies were vulnerable to hacking, content industries sought to expand copyright protection to include limits on the decryption or circumvention of technological protection systems and the trafficking in tools to achieve these means.¹⁴⁰ The passage of the Digital Millennium Copyright Act (DMCA) provided this heightened level of protection.¹⁴¹

Various interest groups, including internet service providers, consumer electronic manufacturers, library associations, and copyright professors expressed concern about the expansion of copyright law upon those who transmit content and wish to make “fair use” of copyrighted works.¹⁴² This concern arose because the DMCA “effectively provides content owners with a new right of technological access, independent of any intellectual property right.”¹⁴³ One example is that the copyright owner may decide that the technological controls will not permit copying of the controlled content, whether or not the copying would be permissible under a statutory exemption such as “fair use.”¹⁴⁴ Since the integrity of the controls in the

135. See Burk, *supra* note 128, at 1553.

136. See *id.*

137. See U.S. Patent No. 5,723,765 (filed June 7, 1995); see also Martha L. Crouch, How the Terminator Terminates: An Explanation for the Non-scientist of a Remarkable Patent for Killing Second Generation Seeds of Crop Plants (1998), <http://www.edmonds-institute.org/crouch.html>.

138. See CROUCH, *supra* note 136.

139. See Burk, *supra* note 128, at 1560.

140. Menell, *supra* note 119, at 134.

141. See Burk, *supra* note 128, at 1564.

142. Menell, *supra* note 119, at 134-38.

143. See Burk, *supra* note 128, at 1564.

144. *Id.*

DMCA is supported by the state, “the result is to shift enforcement of the rights-holder’s interest from penalties for unauthorized infringement to penalties for unauthorized access, deterring otherwise legitimate uses of the protected content.”¹⁴⁵

Although anti-circumvention statutes similar to the DMCA for self-replicating technologies have yet to be adopted, the development of GURTs may have an equally dramatic impact on the balance of ownership and control in biological technologies. This is the case because GURTs contain designs that limit the ability of consumers to exercise choice regarding the use of those products.¹⁴⁶ While GURTs will provide inventors with the economic incentives to invest in R & D by protecting the unlimited use of future generations of seeds and reducing the current costs of policing the use of such technology, they may do so at a cost to the diffusion of current innovations and the development of future innovation. This would occur because the control of intellectual property rights will shift out of the hands of the public and into the hands of private entities that have less concern for maintaining the careful balance within patent law. The enactment of laws akin to the DMCA would support this shift in patent law in a similar manner to the DMCA’s role in copyright law.

Currently, the Plant Variety Protection Act (PVPA) includes a “farmer’s exemption” which allows farmers to save seed from a proprietary crop, and a research exemption which permits agricultural research involving the plant.¹⁴⁷ These exemptions provide exceptions to a seed developer’s control.¹⁴⁸ While plant variety owners have attempted to eliminate such exceptions through licensing regimes that place conditions on access to their seeds, policing the use of the seeds and enforcing the terms of the licenses has proven difficult.¹⁴⁹ GURTs, however, offer plant variety owners the technological means for controlling the use of their products outside of the privileges afforded by the law. Just as copyright holders may employ DRM technologies to limit the transmission or duplication of copyrighted materials in situations where “fair use” permits such actions, GURTs may limit seed-saving exemptions and research exemptions under the PVPA.

The PVPA differs from utility patent protection in its length and scope of coverage, however, both systems are intended to maintain the balance within patent law between incentives to invest in R & D and diffusion of

145. *Id.*

146. *See id.* at 1567.

147. *See id.* at 1557.

148. *Id.*

149. *Id.* at 1158.

current and future innovation. Aspects of patent law, such as the experimental use doctrine, encourage the diffusion of innovation by allowing a person who makes and uses a patented product or process to do so without infringing the patent—if the use is for the purposes of research or experimentation and not for profit.¹⁵⁰ Through making and using a patented product, the researcher can gain a better understanding of how the technology works and may build upon the technology. Technological controls, such as GURTs, however, limit consumer choice regarding the use of those products. As a result, uses that would fall under the experimental use doctrine are no longer available, to the detriment of the patent system and the incentives it establishes.

The development of technological means to control use substitute private technological rules for the public statutes enacted by Congress raises concerns for the public. Producers who utilize “lock out” technologies may in essence become private legislatures, imposing rules of usage without regard to the broader public interest that informs democratic rule-making.¹⁵¹ Without proper legal protection, companies like Monsanto may be forced down a road similar to that taken by copyright holders. GURTs, like DRM technologies, may impede the desires of public legislation and impair the diffusion of current innovation and promotion of future innovation.

IV. CONCLUSION:

The Federal Circuit’s holdings in *Monsanto v. McFarling* and *Monsanto v. Scruggs* provide inventors of self-replicating seed technology with the greatest economic incentives for investing in R & D while balancing the diffusion of current innovation and promoting future innovation. Eliminating patent protection altogether through the first sale doctrine would significantly impair incentives for investment in self-replicating technology. To maintain a return on their investment in R & D, inventors would have to charge high prices through a small number of sales. This would negatively affect small farmers unable to pay the high costs. Additionally, patent exhaustion of next generation seeds would harm seed producers responsible for incorporating Monsanto’s technology into their own products. Finally, the similarities between the history of content licensing and

150. See, e.g., *De Graffenried v. United States*, 20 Cl. Ct. 458, 488 (1990) (stating in dictum that “experimental use may not constitute infringement”); *Chesterfield v. United States*, 159 F. Supp. 371, 375-76 (Ct. Cl. 1958); *Ruth v. Stearns-Rogers Mfg. Co.*, 13 F. Supp. 697, 703 (D. Colo. 1935), *rev’d on other grounds*, 87 F.2d 35 (10th Cir. 1936).

151. See *Burk*, *supra* note 128, at 1567.

DRM technology in digital media and the protection of seed technology in the agricultural industry suggest that the development of GURTs may negatively affect the patent system's efforts to encourage the diffusion of innovations and the development of future innovation by shifting the control of intellectual property rights out of the hands of the public and into the hands of private entities.

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