

**UNDERSTANDING THE RELATIONSHIP BETWEEN THE
DOCTRINE OF PATENT EXHAUSTION AND SELF-REPLICATING
TECHNOLOGIES AFTER *BOWMAN v. MONSANTO CO.***

INTRODUCTION

The agriculture industry has changed significantly over the last thirty years.¹ Surprisingly, however, farming in the United States remains a family business.² In 2007, ninety-eight percent of farms were classified as family organizations.³ Nevertheless, these farming operations have evolved to the point that fewer, larger operations produce the majority of agricultural commodities.⁴ In addition, production per farm has increased over time, allowing greater yields from less acreage.⁵

One of the most dramatic changes for the agriculture industry was the development of genetically engineered (GE) crops, which were introduced commercially in 1996.⁶ GE crops have helped the agriculture industry and other industries through reduced costs for food or drug production, reduced pesticide use, enhanced nutrient composition and food quality, resistance to

1. ERS Bulletin EIB-88, *The Changing Organization of U.S. Farming 1* (U.S.D.A. 2011), available at http://www.ers.usda.gov/media/176816/eib88_1_.pdf.

2. *Id.* at 22.

3. *Id.*

4. *Id.* at 44. According to the Commodity Exchange Act, agricultural commodity means: (1) The following commodities specifically enumerated in the definition of a “commodity” found in section 1a of the Act: Wheat, cotton, rice, corn, oats, barley, rye, flaxseed, grain sorghums, mill feeds, butter, eggs, *Solanum tuberosum* (Irish potatoes), wool, wool tops, fats and oils (including lard, tallow, cottonseed oil, peanut oil, soybean oil and all other fats and oils), cottonseed meal, cottonseed, peanuts, soybeans, soybean meal, livestock, livestock products, and frozen concentrated orange juice, but not onions; (2) All other commodities that are, or once were, or are derived from, living organisms, including plant, animal and aquatic life, which are generally fungible, within their respective classes, and are used primarily for human food, shelter, animal feed or natural fiber; (3) Tobacco, products of horticulture, and such other commodities used or consumed by animals or humans as the Commission may by rule, regulation or order designate after notice and opportunity for hearing; and (4) Commodity-based indexes based wholly or principally on underlying agricultural commodities.
17 C.F.R. § 1.3(zz) (2013).

5. ERS Bulletin EIB-88, *supra* note 1, at 44–45.

6. Graham Brookes & Peter Barfoot, *GM Crops: The Global Economic and Environmental Impact—The First Nine Years 1996–2004*, 8 J. AGROBIOTECHNOLOGY MGMT. & ECON. 187, 187 (2005), available at <http://www.agbioforum.org/v8n23/v8n23a15-brookes.pdf>.

pests and disease, greater food security, and various medical benefits.⁷ In 2004, the global farm income benefit from GE crops, including second season soybeans in Argentina, was \$6.5 billion.⁸ The largest income benefit during that same year was from herbicide-tolerant soybeans, which added \$4.14 billion in additional income.⁹ Furthermore, from 1996 to 2004, the farm income benefit from herbicide-tolerant soybeans in the United States alone was approximately \$6.4 billion.¹⁰ While companies that hold utility patents on GE plants are often blamed for restricting farmers' rights,¹¹ the farmers have obviously benefited from the availability of GE crops.¹² On average, studies have shown that patent holders retain only one-third of the benefits of first-generation GE crops, whereas two-thirds of the benefits were shared "downstream" with consumers or purchasers of the GE crops.¹³

In addition to income, GE crops have created other benefits for agriculture, including decreased pesticide usage, utilization of less toxic herbicides, reduced inputs such as machinery, fuel, and labor, and environmental benefits.¹⁴ From 1982 to 2007, farmers in the United States used thirty percent less hired labor while increasing farm output by thirty-five percent.¹⁵ During this same time period, the total number of acres used for agricultural purposes decreased five percent.¹⁶

7. Theresa Phillips, *Genetically Modified Organisms (GMOs): Transgenic Crops and Recombinant DNA Technology*, NATURE EDUC. (2008), <http://www.nature.com/scitable/topicpage/genetically-modified-organisms-gmos-transgenic-crops-732>.

8. Brookes & Barfoot, *supra* note 6, at 191.

9. *Id.*

10. *Id.* at 192 tbl.5.

11. See Jessica Lynd, Comment, *Gone with the Wind: Why Even Utility Patents Cannot Fence in Self-Replicating Technologies*, 62 AM. U. L. REV. 663, 664–65 (2013).

12. See Henry I. Miller & Graham Brookes, *Debunking 'The Big Lie' About Genetically Engineered Crops*, FORBES (May 23, 2013, 6:00 AM), <http://www.forbes.com/sites/henrymiller/2013/05/23/debunking-the-big-lie-about-genetically-engineered-crops/> ("Farmers certainly don't believe that genetic engineering is unwanted, unneeded or unsuccessful. The net economic benefit at the farm level in 2011 was \$19.8 billion, equal to an average income premium of \$329/acre. For the 16 year period 1996–2011, the global farm income gain was \$98.2 billion. Of the total farm income benefit, 49% (\$48 billion) was due to yield gains resulting from lower pest and weed pressure and improved genetics, with the balance arising from reductions in the cost of production.").

13. Phillips, *supra* note 7.

14. Martin Qaim, *The Benefits of Genetically Modified Crops—and the Costs of Inefficient Regulation*, RFF Policy Commentary, RESOURCES FOR FUTURE (Apr. 2, 2010), <http://www.rff.org/Publications/WPC/Pages/The-Benefits-of-Genetically-Modified-Crops-and-the-Costs-of-Inefficient-Regulation.aspx>.

15. ERS Bulletin EIB-88, *supra* note 1, at 6–7.

16. *Id.* at 12.

Many of the same agricultural benefits can be observed, with some minor differences, in both developed and developing nations.¹⁷ As the world's population continues to grow,¹⁸ farmers need advancements in technology in order to increase production levels from the same amount of tillable acres.¹⁹ Productivity growth in agriculture has been achieved largely with technological advancements, including management, equipment, and GE plants.²⁰ Without the availability of GE crops, maintaining global crop production levels at 2011 levels would have required planting an additional nine percent of the arable land in the United States, including 13.3 million acres of soybeans alone.²¹ While herbicide-tolerant crops have been particularly important for increased efficiency and production, development is currently underway for the next generation of GE technology.²² These crop developments include virus and fungus resistance, cold tolerance, drought resistance, and improved seed quality through protein, oil, or vitamin content.²³

In order to promote innovation in genetics and biotechnology,²⁴ developers of GE plants may obtain utility patents for plant tissue, seeds, or whole plants.²⁵ Seed companies who own the patent rights for GE plants use utility patents in conjunction with license agreements to restrict a farmer's use of patented GE plants.²⁶ These restrictions, inter alia, prevent farmers from saving

17. Qaim, *supra* note 14.

18. U.N. Dep't of Econ. & Soc. Affairs, *World Population Prospects: The 2012 Revision, Volume 1: Comprehensive Tables*, at xviii, U.N. Doc. ST/ESA/SER.A/336 (2013) ("In July 2013, the world population will reach 7.2 billion, 648 million more than in 2005 or an average gain of 81 million persons annually.")

19. ERS Bulletin EIB-88, *supra* note 1, at 65 & tbl.4.3. The agriculture industry relies on improvements in technology for growth more than almost any other section of the U.S. economy. *Id.* From 1960 to 2004, the growth in total factor productivity (TFP), which is a statistical series used to isolate the effect of changes in technology and related factors on output, accounted for 13% of growth in industrial output; however, during this period, TFP accounted for 117% of the growth in agricultural output. *Id.*

20. *Id.* at 51.

21. Miller & Brookes, *supra* note 12.

22. ERS Bulletin EIB-88, *supra* note 1, at 51.

23. *Id.*

24. *See* *Diamond v. Chakrabarty*, 447 U.S. 303, 307 (1980). Patent laws promote progress by offering incentives to investors for a limited time, and this "authority of Congress is exercised in the hope that '[t]he productive effort thereby fostered will have a positive effect on society through the introduction of new products and processes of manufacture into the economy, and the emanations by way of increased employment and better lives for our citizens.'" *Id.* (quoting *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 480-81 (1974)).

25. *See* *J.E.M. Ag Supply v. Pioneer Hi-Bred Int'l*, 534 U.S. 124, 132 (2001); *Ex parte Hibberd*, 1985 WL 71986, at *2 (B.P.A.I. Sep. 18, 1985).

26. *J.E.M. Ag Supply*, 534 U.S. at 128; *see also* *Monsanto Co. v. Scruggs*, 459 F.3d 1328, 1333 (Fed. Cir. 2006).

for replanting any seed produced from patented product.²⁷ In *Bowman v. Monsanto Co.*,²⁸ the United States Supreme Court concluded that patent rights apply when a farmer plants commodity soybean seed²⁹ and saves and replants seeds harvested from that commodity seed.³⁰ Moreover, the Court concluded that the doctrine of patent exhaustion did not apply because the doctrine does not restrict a patentee from preventing the buyer from making copies of the patented product.³¹ In the subsequent sections, this Note discusses patent rights and the patent exhaustion doctrine as applied by the Supreme Court in *Bowman v. Monsanto Co.* and argues that the Court correctly concluded that the patent exhaustion doctrine does not apply to self-replicating technologies in this context.³²

In support of this argument, Part I of this Note outlines the development of patent law and the application of the doctrine of patent exhaustion as a defense in patent infringement lawsuits. In addition, Part I discusses the broadening of the scope of utility patents to include GE plants as patentable subject matter under 35 U.S.C. § 101 (2006). Lastly, Part I addresses the use of license agreements in conjunction with patented GE plants and the application of patent exhaustion in the context of GE plants.

Part II of this Note summarizes the Supreme Court's decision in the *Bowman* case, as well as provides necessary background from the district court and Federal Circuit decisions. Part III argues that the Court's holding that the doctrine of patent exhaustion was inapplicable to the factual situation of this case was correct. Moreover, while the Court's decision effectively removes the farmer's option to plant and save commodity seed, it consequently promotes the purpose of patents to encourage and protect innovation. Lastly, Part III endorses the Court's narrow holding and discusses generally the application of the patent exhaustion doctrine to self-replicating technologies.

27. See *Scruggs*, 459 F.3d at 1333 (noting that Monsanto required growers to sign a license agreement or "Technology Agreement" that (1) required growers to only use Monsanto's biotechnology seed for a single crop, (2) prohibited transfer or re-use of seed containing biotechnology for replanting, (3) prohibited research or experimentation, and (4) required payment of a technology fee); see also *Monsanto Co. v. McFarling*, 302 F.3d 1291, 1293 (Fed. Cir. 2002).

28. *Bowman v. Monsanto Co.*, 133 S. Ct. 1761 (2013).

29. "Commodity seeds are a mixture of undifferentiated seeds harvested from various sources, including from farms that grow Roundup Ready[®] soybeans and those that do not, although nearly ninety-four percent of Indiana's acres of soybeans planted in 2007 were planted using herbicide resistant varieties." *Monsanto Co. v. Bowman*, 657 F.3d 1341, 1345 (Fed. Cir. 2011).

30. *Bowman*, 133 S. Ct. at 1769 (explaining commodity seed was purchased from a grain elevator that purchases grain from farmers and resells that grain for human and animal consumption).

31. *Id.* at 1766.

32. *Id.* at 1769.

I. HISTORICAL ANALYSIS

A. *Development of Plant Utility Patents*

The United States Constitution grants Congress the power to provide authors and inventors with “the exclusive [r]ight to their respective [w]ritings and [d]iscoveries” for a limited time, for the purpose of promoting science and the arts.³³ Under this constitutional power, Congress enacted the first patent statute in 1790.³⁴ According to the iteration of this statutory authority applicable at the time of *Bowman*, a patent grants the patentee “the right to exclude others from making, using, offering for sale, or selling” the patented product.³⁵ Patent protection, however, only applies to established categories of patentable subject matter, including “any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof.”³⁶

1. Scope of Utility Patents

Congress intended that patentable subject matter under 35 U.S.C. § 101 be interpreted broadly to “include anything under the sun that is made by man.”³⁷ In addition, the Supreme Court concluded that the terms “manufacture” and “composition of matter” under § 101, as modified by “any,” “plainly contemplated that the patent laws would be given wide scope.”³⁸ A distinction exists between those “manifestations of . . . nature, free to all men and reserved exclusively to none”³⁹ and the “nonnaturally occurring manufacture or composition of matter—a product of human ingenuity ‘having a distinctive name, character [and] use.’”⁴⁰ Therefore, the relevant inquiry for patentable

33. U.S. CONST. art. I, § 8, cl. 8. This clause provides a constitutional basis for rights granted under patent and copyright law.

34. 1 DONALD S. CHISUM, CHISUM ON PATENTS § OV-2 (2014).

35. 35 U.S.C. § 154(a)(1) (2006). The patent term expires twenty years after the earliest effective filing date. *Id.* § 154(a)(2).

36. *Id.* § 101.

37. *Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980) (determining that a genetically engineered bacterium capable of breaking down multiple components of crude oil was a non-naturally occurring manufacture or composition of matter and thus patentable subject matter).

38. *Id.* at 308. In concluding that the legislature’s statutory language in defining patentable subject matter was unambiguous, the Court noted that “[t]he subject-matter provision of the patent law have been cast in broad terms to fulfill the constitutional and statutory goal of promoting ‘the Progress of Science and the useful Arts’ with all that means for the social and economic benefits envisioned by Jefferson.” *Id.* at 315.

39. *Id.* at 309 (internal quotation marks omitted) (quoting *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127, 130 (1948)).

40. *Id.* at 309–10 (quoting *Hartranft v. Wiegmann*, 121 U.S. 609, 615 (1887)).

subject matter is whether the invention is a product of nature or man-made, not whether the product is living or inanimate.⁴¹

2. Utility Patents, Plant Patents, and the Plant Variety Protection Act

In 1930, Congress enacted the Plant Patent Act (PPA)⁴² providing patent protection for a person who “invents or discovers and asexually reproduces any distinct and new variety of plant.”⁴³ A new variety of plant is patentable under the PPA if it meets the requirements under § 101, except for the description requirement as outlined in § 162.⁴⁴ In addition, in 1970 Congress passed the Plant Variety Protection Act (PVPA),⁴⁵ which provided that a “breeder of any sexually reproduced or tuber propagated plant variety . . . shall be entitled to plant variety protection for the variety.”⁴⁶ Under this Act, Congress authorized patent-like protection for sexually reproduced varieties, but the PVPA provides a narrower scope of protection than a utility patent.⁴⁷

In 1986, the United States Patent and Trademark Office’s Board of Patent Appeals and Interferences, relying heavily on the Supreme Court’s ruling in *Diamond v. Chakrabarty*, found that plants are patentable subject matter under § 101, and the PPA and PVPA are not the exclusive forms of protection for plants.⁴⁸ Later, the Supreme Court also concluded the PPA and PVPA are not the exclusive means to obtain a right to exclude others from using, selling, or reproducing plants.⁴⁹ Therefore, utility patents may be issued for plants, provided the requirements under § 101 are met.⁵⁰

B. The Doctrine of Patent Exhaustion

1. Initial Sale Terminates Patent Rights

A patentee has exclusive rights and may prevent a person from making, selling, or using the patented product.⁵¹ A person who, “without authority

41. *Id.* at 313.

42. 35 U.S.C. §§ 161–64 (2006); *see* *J.E.M. Ag Supply v. Pioneer Hi-Bred Int’l*, 534 U.S. 124, 133 (2001) (stating that plant patents provide exclusive protection to the asexual reproduction of the plant and also include a relaxation of the description requirement).

43. 35 U.S.C. § 161.

44. *J.E.M. Ag Supply*, 534 U.S. at 133 & n.6. *See also* 35 U.S.C. § 162 (“No plant patent shall be declared invalid for noncompliance with section 112 if the description is as complete as is reasonably possible.”).

45. 7 U.S.C. §§ 2321–2582 (2006).

46. *Id.* § 2402(a).

47. *J.E.M. Ag Supply*, 534 U.S. at 138.

48. *See Ex parte Hibberd*, 1985 WL 71986, at *2–3 (B.P.A.I. Sep. 18, 1985).

49. *J.E.M. Ag Supply*, 534 U.S. at 145.

50. *Id.*

51. *Van Kannell Revolving Door Co. v. Revolving Door & Fixture Co.*, 293 F. 261, 262 (S.D.N.Y. 1920).

makes, uses, offers to sell, or sells any patented invention, within the United States or import into the United States any patented invention during the term of the patent therefor, infringes the patent.”⁵² Under the doctrine of patent exhaustion or “first sale” doctrine, the patent owner’s statutory right to exclude is exhausted once a product that fully embodies the patented invention is sold without limitation.⁵³

The policy behind the doctrine is that in an unconditional sale, the patent holder has negotiated a sale equivalent to the full value of the patented product.⁵⁴ As a result, the doctrine of patent exhaustion only applies as a result of an authorized sale of the patented product by the patent holder.⁵⁵ As the Supreme Court stated in *Motion Picture Patents Co. v. Universal Film Manufacturing Co.*, “[T]he right to vend is exhausted by a single, unconditional sale, the article sold being thereby carried outside the monopoly of the patent law and rendered free of every restriction which the vendor may attempt to put upon it.”⁵⁶ Therefore, the unconditional sale of a patented product exhausts the patent owner’s right to control the use of the patented product.⁵⁷ The purchaser may use and resell the product free of patent infringement but may not reproduce or copy the product.⁵⁸

2. Implication of Restrictive Licenses

Parties to a transaction involving a patented product retain the freedom to contract regarding conditions placed on the patented article.⁵⁹ Therefore, a patent owner may utilize restrictive licenses or “grant a license ‘upon any condition the performance of which is reasonably within the reward which the patentee by the grant of the patent is entitled to secure.’”⁶⁰ The Supreme Court has held that price-fixing and tying restrictions affixed to patented products are per se illegal.⁶¹ However, as long as a condition does not violate a principle of law or policy, such as patent, contract, anti-trust, or patent misuse law, parties

52. 35 U.S.C. § 271 (2006).

53. Amber Hatfield Rovner, *Practical Guide to Application of (or Defense Against) Product-Based Infringement Immunities Under the Doctrines of Patent Exhaustion and Implied License*, 12 TEX. INTELL. PROP. L.J. 227, 229 (2004).

54. *B. Braun Med., Inc. v. Abbott Labs.*, 124 F.3d 1419, 1426 (Fed. Cir. 1997).

55. *United States v. Univis Lens Co.*, 316 U.S. 241, 249 (1942).

56. *Motion Picture Patents Co. v. Universal Film Mfg. Co.*, 243 U.S. 502, 516 (1917).

57. *See Univis*, 316 U.S. at 252; *Mallinckrodt, Inc. v. Medipart, Inc.*, 976 F.2d 700, 706 (Fed. Cir. 1992).

58. *Univis*, 316 U.S. at 250.

59. *Mallinckrodt*, 976 F.2d at 708. *See also* *Gen. Talking Pictures Corp. v. W. Elec. Co.*, 305 U.S. 124, 127 (1938) (“That a restrictive license is legal seems clear.”).

60. *See Gen. Talking Pictures Corp.*, 305 U.S. at 127 (quoting *United States v. Gen. Elec. Co.*, 272 U.S. 476, 489 (1926)).

61. *See Motion Picture Patents Co.*, 243 U.S. at 516–17; *Bauer & Cie v. O’Donnell*, 229 U.S. 1, 17–18 (1913).

retain the freedom to contract and can agree to specific conditions.⁶² For a patent misuse defense, the license must have the overall effect of restraining competition unlawfully.⁶³ Therefore, parties may contract as they choose, and “any conditions which are not in their very nature illegal with regard to this kind of property, imposed by the patentee and agreed to by the licensee for the right to manufacture or use or sell the [patented] article, will be upheld by the courts.”⁶⁴

In addition, the doctrine of patent exhaustion does not apply when a license or sale is expressly conditional since, by inference, “the parties negotiated a price that reflects only the value of the ‘use’ rights conferred” by the patent holder.⁶⁵ The relevant inquiry for the appropriateness of a restrictive license is whether the restriction is reasonably within the patent grant, or within the scope of the subject matter of the patent, or, if not, whether the patent holder’s restriction has an anticompetitive effect “not justifiable under the rule of reason.”⁶⁶

C. *Genetically Engineered Plants and Utility Patents*

1. Development of Genetically Engineered Plants

Under the regulations of the United States Department of Agriculture, genetic engineering is defined as “genetic modification of organisms by recombinant DNA techniques.”⁶⁷ Generally, recombinant DNA techniques involve the isolation of DNA fragments, recombination of these fragments, and insertion into a living organism.⁶⁸ The genotype, or genetic makeup, of plants can be altered by transferring genes for specific traits into a particular plant species.⁶⁹ The desired genotype must still be selected by traditional techniques, yet recombinant DNA techniques allow for an increased probability of success in developing the desired plant trait.⁷⁰ In addition, these techniques introduce

62. *Mallinckrodt*, 976 F.2d at 703, 708.

63. *Id.* at 706.

64. *Id.* at 703 (quoting *E. Bement & Sons v. Nat’l Harrow Co.*, 186 U.S. 70, 91 (1902)). *See also Gen. Talking Pictures Corp.*, 305 U.S. at 126 (stating that where a patented product is subject to different uses, a patent owner may legally restrict the purchase to a particular use).

65. *B. Braun Med., Inc. v. Abbott Labs.*, 124 F.3d 1419, 1426 (Fed. Cir. 1997) (“[E]xpress conditions accompanying the sale or license of a patented product are generally upheld.”).

66. *Mallinckrodt*, 976 F.2d at 708 (“Anticompetitive effects that are not *per se* violations of law are reviewed in accordance with the rule of reason. Patent owners should be in a worse position, by virtue of the patent right to exclude, than owners of other property used in trade.”).

67. 7 C.F.R. § 340.1 (2013).

68. DANIEL L. HARTL, *BASIC GENETICS* 420 (2d ed. 1991).

69. *Id.* at 6, 434.

70. *Id.* at 420.

genetic variation in plants that would not be possible with traditional plant breeding.⁷¹

In 1996, the first GE agriculture plants, including herbicide-tolerant varieties, became commercially available.⁷² These herbicide-tolerant varieties, which allow for a single herbicide application, have increased yields and lowered farmers' costs through decreased labor and machinery operation.⁷³ As of 2007, over ninety percent of all soybean acres were planted with herbicide-tolerant soybeans.⁷⁴ Plant varieties tolerant to glyphosate (N-phosphonomethylglycine)⁷⁵ herbicides, like Monsanto Company's (Monsanto) Roundup[®] product, have allowed for decreased reliance on other more toxic herbicides; however, the heavy reliance on glyphosate herbicides has resulted in the development of glyphosate-resistant weeds.⁷⁶

2. Utility Patents for Genetically Engineered Plants

As decided in *J.E.M. Ag Supply v. Pioneer Hi-Bred International*, whole plants, plant tissue, seeds, or cells, including GE plants, are patentable subject matter under 35 U.S.C. § 101.⁷⁷ In order to obtain a utility patent, the plant must meet the requirements under §§ 101–103 as new, useful, and nonobvious.⁷⁸ In addition, the patentable GE plant must meet the specification requirement under § 112 requiring a written description to enable someone skilled in the trade to “make and use” the invention.⁷⁹

Advances in biological and genetic knowledge have enhanced a plant breeder's ability to meet the requirements for a utility patent.⁸⁰ While the requirements to obtain a general utility patent are more stringent than those under the PVPA, the protections provide a greater right of exclusion.⁸¹ For example, unlike the PVPA, the protections for plants under utility patents do not provide exemptions for research or saving seed.⁸² Therefore, the practice of saving seeds for planting the next season, once a common practice for

71. *See id.*; ERS Bulletin EIB-11, The First Decade of Genetically Engineered Crops in the United States 1 (U.S.D.A. 2006), available at http://www.ers.usda.gov/media/255908/eib11_1.pdf.

72. ERS Bulletin EIB-88, *supra* note 1, at 51.

73. *Id.*

74. *Id.*

75. *Monsanto Co. v. Bowman*, 657 F.3d 1341, 1343 (Fed. Cir. 2011).

76. ERS Bulletin EIB-88, *supra* note 1, at 52.

77. *J.E.M. Ag Supply v. Pioneer Hi-Bred Int'l*, 534 U.S. 124, 145 (2001).

78. *Id.* at 142.

79. *Id.*

80. *Id.* at 134.

81. *Id.* at 143.

82. *J.E.M. Ag Supply*, 534 U.S. at 143.

farmers,⁸³ is not a right provided to purchasers of seed protected by utility patents.⁸⁴

Monsanto's lineup of GE plants, including corn, soybeans, cotton, and other specialty crops, are protected by a number of patents.⁸⁵ Monsanto's Roundup Ready[®] technology was developed so that soybeans, among other plants, would be resistant to applications of glyphosate herbicides like Monsanto's Roundup product.⁸⁶ Roundup Ready soybeans are protected by two patents, U.S. Patent Nos. 5,352,605 ('605 Patent) and RE39,247 E ('247 Patent).⁸⁷ On October 4, 1994, the United States Patent and Trademark Office (USPTO) granted Monsanto the '605 Patent for "chimeric genes which are capable of being expressed in plant cells, which utilize promoter regions derived from viruses which are capable of infecting plant cells."⁸⁸ The '247 Patent, a reissue of U.S. Patent No. 5,633,435, was issued on August 22, 2006, for glyphosate-tolerant 5-enolpyruvylshikimate-3-phosphate synthases (EPSPS) including "[g]enes encoding Class II EPSPS enzymes . . . [that] are useful in producing transformed bacteria and plants which are tolerant to glyphosate herbicide."⁸⁹ These patents form the basis for Monsanto's patent infringement litigation involving Roundup Ready soybeans.⁹⁰

3. Implication of the Doctrine of Patent Exhaustion

Self-replicating technologies, like soybeans, complicate the determination of a patent holder's rights under the utility patent.⁹¹ In addition, the application of the doctrine of patent exhaustion is not clear due to the technology's ability to self-replicate.⁹² Since these technologies can self-replicate, thus creating new copies of the patented product, purchasers could continue to replicate the patented product, theoretically in perpetuity, putting the patent holder's rights at risk.⁹³

83. See Richard Schiffman, *Life in the Rural Police State of Monsanto*, TRUTHOUT (June 19, 2013, 9:08 AM), <http://www.truth-out.org/news/item/16985-life-in-the-rural-police-state-of-monsanto>.

84. *Monsanto Co. v. McFarling*, 302 F.3d 1291, 1299 (Fed. Cir. 2002).

85. *Product Patents*, MONSANTO, <http://www.monsanto.com/products/pages/product-patents.aspx#p2> (last visited June 3, 2014).

86. *Monsanto Co. v. Bowman*, 657 F.3d 1341, 1343 (Fed. Cir. 2011).

87. *Id.*

88. U.S. Patent No. 5,352,605 (filed Oct. 28, 1993). See also *Bowman*, 657 F.3d at 1343.

89. U.S. Patent No. RE39,247 E (filed July 18, 2003). See also *Bowman*, 657 F.3d at 1343.

90. See *Bowman*, 657 F.3d at 1343; *Monsanto Co. v. Scruggs*, 459 F.3d 1328, 1332 (Fed. Cir. 2006); *Monsanto Co. v. McFarling*, 302 F.3d 1291, 1293 (Fed. Cir. 2002).

91. Douglas Fretty, Note, *Both a License and a Sale: How to Reconcile Self-Replicating Technology with Patent Exhaustion*, 5 J. BUS. ENTREPRENEURSHIP & L. 1, 2 (2011).

92. *Id.*

93. *Id.*

In *Monsanto Co. v. McFarling*, the United States Court of Appeals for the Federal Circuit determined that the doctrine of patent exhaustion was inapplicable to patented soybeans because the new seeds, or the copies of the original product, were never sold.⁹⁴ Since the soybeans that were harvested from the original patented product, the “copies,” were never purchased from Monsanto, the doctrine of patent exhaustion did not apply.⁹⁵ Moreover, the price paid for the original patented soybean seeds “reflected only the value of the ‘use’ rights conferred by the patentee.”⁹⁶ As a result, the original sale of the patented soybeans did not confer a right to make copies.⁹⁷ In addition, it is within the scope of the patent for Monsanto to restrict others, through the Technology Agreement, from making copies of the patented soybeans for the purposes of planting.⁹⁸

The same principles applied when a farmer purchased patented Roundup Ready soybeans without signing a License Agreement and saved seed for planting in subsequent growing seasons.⁹⁹ The original purchase was conditioned on the farmer obtaining a license; therefore, whether a License Agreement was signed or not, the conditions still applied.¹⁰⁰ Consequently, since the progeny soybean seeds, or copies of the originally purchased seed, were never sold, the doctrine of patent exhaustion did not apply.¹⁰¹ Self-replicating technology “does not give a purchaser the right to use replicated copies of the technology” without restriction.¹⁰² Application of the doctrine of patent exhaustion in these situations would “eviscerate the rights of the patent holder.”¹⁰³

94. *McFarling*, 302 F.3d at 1299. McFarling purchased Monsanto patented Roundup Ready soybeans and signed the Technology Agreement. *Id.* at 1293. He then saved 1500 bushels of the patented soybeans for planting the next season, in violation of the License Agreement. *Id.* McFarling repeated this practice the next season until Monsanto filed suit for patent infringement and breach of contract. *Id.*

95. *Id.* at 1299.

96. *Id.* (quoting *B. Braun Med., Inc. v. Abbott Labs*, 124 F.3d 1419, 1426 (Fed. Cir. 1997)).

97. *Id.*

98. *Id.* at 1298.

99. *Monsanto Co. v. Scruggs*, 459 F.3d 1328, 1333 (Fed. Cir. 2006). Scruggs argued that it purchased the Monsanto soybean seeds in an unrestricted sale, so the doctrine of patent exhaustion provided that Scruggs could use the soybean seeds as it saw fit. *Id.* at 1335.

100. *Id.* at 1336.

101. *Id.* (quoting *McFarling*, 302 F.3d at 1299).

102. *Id.*

103. *Id.*

II. *MONSANTO CO. v. BOWMAN*A. *Factual Background*

Defendant Vernon Bowman regularly purchased soybean seeds containing Roundup Ready technology from Pioneer Hi-Bred (Pioneer), a Monsanto-licensed seed producer.¹⁰⁴ In conjunction with these purchases, Bowman executed the Pioneer Hi-Bred Technology Agreement, which is similar in language and scope to Monsanto's Technology Agreement.¹⁰⁵ Beginning in 1999, Bowman planted Pioneer soybean seed containing Roundup Ready technology, and, pursuant to the Technology Agreement, did not save any seed from any of these plantings.¹⁰⁶

In addition to the licensed product, Bowman purchased commodity seed from a local grain elevator for a second-season planting, or "double-crop soybeans."¹⁰⁷ After planting, Bowman applied a glyphosate-based herbicide to the commodity seeds, killing weeds and any plants not glyphosate resistant, or more specifically not exhibiting the Roundup Ready trait.¹⁰⁸ Following the harvest of the soybean crop produced from the commodity seed, Bowman saved some seed for planting the next season.¹⁰⁹ Bowman also supplemented the saved seed with additional purchases of commodity seed from the grain elevator and continued this practice from the initial planting in 1999 to 2007, when Monsanto sued Bowman for patent infringement.¹¹⁰

B. *Monsanto's Claim*

Monsanto argued that Bowman infringed on its patent by the unauthorized planting of commodity seed.¹¹¹ In addition, Bowman saved seed harvested from the commodity seed and then planted successive generations of saved seed, along with additionally purchased commodity seed.¹¹² All of these products included soybean seed containing the Roundup Ready trait.¹¹³

104. *Monsanto Co. v. Bowman*, 657 F.3d 1341, 1345 (Fed. Cir. 2011).

105. *Id.*

106. *Id.*

107. *Id.* Grain elevators purchase seed from farmers and sell this commodity seed for consumption purposes. *See Bowman v. Monsanto Co.*, 133 S. Ct. 1761, 1765 (2013). A grain elevator is generally prohibited from packaging the commodity seed and selling it as agricultural seed. *See* 7 U.S.C. § 1571 (2006).

108. *See Bowman*, 133 S. Ct. at 1765; *Bowman*, 657 F.3d at 1345–46.

109. *Bowman*, 657 F.3d at 1346.

110. *Id.*; *Monsanto Co. v. Bowman*, 686 F. Supp. 2d 834, 836 (S.D. Ind. 2009).

111. *Bowman*, 686 F. Supp. 2d at 836.

112. *Id.*

113. *Id.*

Monsanto's Technology Agreement authorizes farmers to sell seed to grain elevators as a commodity.¹¹⁴ However, Monsanto maintained that it owns and licenses the glyphosate resistant trait, and, therefore, the technology contained in all progeny seed belongs to Monsanto.¹¹⁵ While the seeds belong to the farmer, the technology belongs to Monsanto and may not be duplicated through planting without authorization from Monsanto.¹¹⁶ Since the Roundup Ready trait continues with each successive crop, Monsanto argued that without this restriction, farmers could purchase commodity soybeans and receive the benefit of the Roundup Ready trait without properly compensating Monsanto for the technology, thus circumventing the patent.¹¹⁷

C. *Bowman's Defense*

Bowman contended that based on the doctrine of patent exhaustion, commodity seeds involve an authorized, unconditional sale from the farmer to the grain elevator, so Monsanto could no longer control the use of the soybean seeds.¹¹⁸ According to Bowman's argument, when licensed soybeans containing the Roundup Ready trait are harvested and sold by the farmer to the grain elevator, the seeds are sold without restriction.¹¹⁹ Therefore, when this seed is mixed with seed from other farmers and sold as commodity seed, the doctrine of patent exhaustion applies to remove the commodity seed from patent protection.¹²⁰

Moreover, Bowman argued that Monsanto's claim for patent protection for all seeds with Roundup Ready technology effectively eliminates the low-cost commodity seed option.¹²¹ The self-replicating nature of soybeans, which reproduces the Roundup Ready trait with each successive generation, further complicated the issue of farmers utilizing commodity seed.¹²² In addition, considering the domination of Roundup Ready soybeans in the market and the lack of separation at the grain elevator between seeds containing Roundup Ready technology and those without, the grain elevator's commodity seed necessarily contains the Roundup Ready trait.¹²³ Therefore, commodity seed purchased from most grain elevators would contain some proportion of patented product and could not be used for planting.¹²⁴ Bowman argued that

114. *Bowman*, 657 F.3d at 1345.

115. *Bowman*, 686 F. Supp. 2d at 837.

116. *Id.*

117. *Id.*

118. *Bowman v. Monsanto Co.*, 133 S. Ct. 1761, 1765 (2013).

119. *Bowman*, 686 F. Supp. 2d at 836.

120. *Id.* See also *Monsanto Co. v. Bowman*, 657 F.3d 1341, 1346 (Fed. Cir. 2011).

121. *Bowman*, 686 F. Supp. 2d at 836–37.

122. *Id.* at 836.

123. *Id.*

124. See *id.* at 836–37. See also *Bowman v. Monsanto Co.*, 133 S. Ct. 1761, 1768 (2013).

providing Monsanto patent protection in the case of commodity seeds would “‘creat[e] an impermissible exception to the exhaustion doctrine’ for patented seeds and other ‘self-replicating technologies.’”¹²⁵

D. *The Supreme Court’s Analysis*

1. Patent Exhaustion

In addressing Bowman’s defense of patent exhaustion, the Court emphasized that the doctrine restricts a patentee’s rights related to the particular article sold but does not restrict the right to prevent copying of the patented product.¹²⁶ A copy of the patented product brings about the patentee’s rights for a second time because the patentee only received the reward associated with the patent for the original product sold.¹²⁷ Therefore, the Court reasoned that Bowman could resell the commodity seeds purchased from the elevator, consume the seeds, or feed the seeds to his animals, and Monsanto, based on the doctrine of patent exhaustion, would have no right to restrict these uses.¹²⁸

However, the doctrine does not confer the right to Bowman to make copies of the patented product without Monsanto’s authorization, express or implied.¹²⁹ Consequently, when Bowman purchased and planted the commodity seed, sprayed the soybeans with glyphosate herbicide, and harvested the plants, he made new copies of the patented product, so the doctrine of patent exhaustion did not apply.¹³⁰

The Court explained that the above conclusion was necessary to balance the invention and reward.¹³¹ If patent exhaustion applied, Monsanto would receive the reward for the first sale of seed, but nothing would stop farmers or other companies from making consecutive copies of the original product without Monsanto receiving any reward.¹³² Therefore, the purchaser would receive the benefit of the invention or the Roundup Ready technology, but Monsanto would not be compensated for the repeated use of the copies of its invention.¹³³

125. *Bowman*, 133 S. Ct. at 1768 (quoting Brief for Petitioner at 16, *Bowman*, 133 S. Ct. 1761 (2013) (No. 11-796)).

126. *Id.* at 1766 (citing *United States v. Unis Lens Co.*, 316 U.S. 241, 251 (1942)).

127. *Id.* (quoting *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 346 (1961); *Univis*, 316 U.S. at 251).

128. *Id.*

129. *Id.*

130. *Bowman*, 133 S. Ct. at 1767.

131. *Id.*

132. *Id.*

133. *See id.*

While Bowman contended he was merely “using” the patented product as it was intended, the Court refused to allow an exception to the rule that the doctrine of patent exhaustion does not permit the purchaser of a patented product to reproduce the product.¹³⁴ The undiminished right of the patent holder to prohibit others from copying the patented product is consistent with the purpose of patent protection to create incentives for innovation, otherwise the patent would not last for twenty years but for only one sale of the product.¹³⁵

Moreover, the Court’s ruling did not limit farmers’ ability to utilize the product purchased.¹³⁶ Under Monsanto’s Technology Agreement or another licensee’s technology agreement, a farmer can purchase seeds with Roundup Ready technology and produce copies of those seeds, through planting and harvesting, which may be sold as a commodity or consumed.¹³⁷ As for the commodity seed utilized by Bowman, this seed may be consumed according to the intended and authorized use of the commodity seed purchased from grain elevators.¹³⁸ In this context, Monsanto receives the reward for the soybean seed containing the Roundup Ready trait, and the farmer is also allowed to utilize and benefit from the technology or innovation.¹³⁹

2. Self-Replicating Products

Bowman argued that the soybeans, as naturally self-replicating, created copies of Monsanto’s patented product without any influence or control by Bowman.¹⁴⁰ The Court discredited this “blame-the-bean” defense.¹⁴¹ Bowman did not passively observe eight consecutive seasons of Roundup Ready soybean seed planting and harvesting.¹⁴² Rather, Bowman executed a unique plan by purchasing a grain elevator’s commodity seed, with knowledge that the seed would contain a majority of Roundup Ready seed.¹⁴³ Bowman then selected the Roundup Ready plants by applying glyphosate-based herbicide.¹⁴⁴ Thus, Bowman actively participated in a planned process to produce successive crops of Roundup Ready soybeans without paying Monsanto for the patented product.¹⁴⁵

134. *Id.* at 1768.

135. *Bowman*, 133 S. Ct. at 1768.

136. *Id.*

137. *See id.*

138. *See id.*

139. *See id.*

140. *Bowman*, 133 S. Ct. at 1768–69.

141. *Id.* at 1769.

142. *See id.*

143. *See id.*

144. *See id.*

145. *See Bowman*, 133 S. Ct. at 1769.

While the Court conceded that the self-replicating nature of soybeans played a role in the process, it emphasized Bowman's control over the process of copying Monsanto's patented product.¹⁴⁶ However, the Court limited the holding to the particular factual circumstances of this case and failed to decide whether patent exhaustion would be applicable in other situations involving self-replicating technologies.¹⁴⁷ Although the Court did not specifically address the instances which might exempt a purchaser of self-replicating technologies from patent infringement, or circumstances in which the doctrine of patent exhaustion would apply, the Court did indicate a couple of examples that are different from Bowman's situation and would possibly result in a different conclusion.¹⁴⁸ Specifically, the Court noted that self-replication may occur outside the purchaser's control or may be a "necessary but incidental step in using the item for another purpose."¹⁴⁹

III. ANALYSIS

A. Patent Exhaustion

1. The Doctrine of Patent Exhaustion Is Inapplicable When a Purchaser Copies a Patented Product

The Supreme Court's analysis of the doctrine of patent exhaustion in *Bowman* is consistent with other federal cases involving Roundup Ready technology¹⁵⁰ and clearly indicates a distinction between "using" versus "copying" or "making" the patented product.¹⁵¹ While Bowman claimed the defense of patent exhaustion, the doctrine of patent exhaustion only applies to exhaust the patentee's rights in the original patented article sold but does not confer a right to make additional copies of the product.¹⁵² The distinction regarding patented GE crops lies in what the farmer sees as "using" the

146. *Id.*

147. *See id.*

148. *See id.*

149. *Id.*

150. *Monsanto Co. v. Scruggs*, 459 F.3d 1328, 1334–36 (Fed. Cir. 2006); *Monsanto Co. v. McFarling*, 302 F.3d 1291, 1299–1301 (Fed. Cir. 2002).

151. *See Bowman*, 133 S. Ct. at 1769; *see also* Jeremy N. Sheff, *Self-Replicating Technologies*, 16 STAN. TECH. L. REV. 229, 238 (2013) ("[T]he application of the use/make distinction in the Roundup-Ready cases ignores the elephant in the room: the only and intended 'use' of seeds or any other self-replicating technology necessarily 'makes' a newly infringing article—this is the defining characteristic of self-replicating technologies.").

152. *See Mallinckrodt, Inc. v. Medipart, Inc.*, 976 F.2d 700, 706 (Fed. Cir. 1992) ("[U]nconditional sale of a patented device exhausts the patentee's right to control the purchaser's use of the device."). *See also B. Braun Med., Inc. v. Abbott Labs.*, 124 F.3d 1419, 1426 (Fed. Cir. 1997).

patented product to grow soybean seed and what the Court ruled is “making” additional copies of the patented product.¹⁵³

Bowman recognized the seed containing Roundup Ready technology that he purchased from Pioneer was restricted according to the Technology Agreement, so he was not allowed to, and did not, save seed from the soybeans purchased under this agreement.¹⁵⁴ When Bowman purchased this seed, his price reflected only the use rights conferred, and the new seeds, which had not been sold by the patentee, would not implicate the doctrine of patent exhaustion.¹⁵⁵ Accordingly, mutual benefit arises between Monsanto, as the patent holder, and the farmer when the farmer is permitted to plant the Roundup Ready soybeans purchased under the license agreement and grow additional seed, which the farmer can then sell for profit as a commodity.¹⁵⁶

While the inapplicability of the doctrine of patent exhaustion is straightforward in the situation above where the farmer purchases patented seed under a license agreement,¹⁵⁷ the analysis in this case was complicated by Bowman’s purchase of commodity seed from a grain elevator.¹⁵⁸ When a farmer sells seed produced from a patented product, he cannot convey to the grain elevator the right to plant that seed, namely the commodity seed, because the farmer did not possess the right himself.¹⁵⁹ Therefore, as a purchaser of commodity seed from a grain elevator, Bowman was not conferred the right to plant any commodity seed that contained patented product because the grain elevator did not have the right itself.¹⁶⁰

The patent holder, Monsanto, retained the right to restrict the making of additional patented product, and Monsanto did not confer to the purchaser of patented soybeans the right to produce seed beyond one generation.¹⁶¹ In addition, the doctrine of patent exhaustion does not provide any exemption for a purchaser to “copy” or “make” the patented product.¹⁶² Consequently, Bowman had no right to plant the commodity seed, select for soybeans containing the Roundup Ready trait by applying glyphosate-based herbicide,

153. See *Bowman*, 133 S. Ct. at 1766–67 (“‘[M]ake’ means ‘cause to exist, occur, or appear,’ or more specifically, ‘plant and raise (a crop).’”).

154. *Monsanto Co. v. Bowman*, 657 F.3d 1341, 1345 (Fed. Cir. 2011).

155. See *McFarling*, 302 F.3d at 1298–99.

156. See *Bowman*, 133 S. Ct. at 1768 (“No sane farmer, after all, would buy the product without some ability to grow soybeans from it. And so Monsanto, predictably enough, sells Roundup Ready seed to farmers with a license to use it to make a crop.”).

157. See *id.* at 1766. Bowman acknowledged “the ‘well settled’ principle ‘that the exhaustion doctrine does not extend to the right to ‘make’ a new product.’” *Id.* (quoting Brief for Petitioner, *supra* note 125, at 37).

158. See *id.* at 1765.

159. See *Monsanto Co. v. Bowman*, 686 F. Supp. 2d 834, 839 (S.D. Ind. 2009).

160. See *id.*

161. *Bowman*, 133 S. Ct. at 1765–66.

162. *Id.* at 1766.

and harvest the progeny seeds, which were essentially additional copies of the patented product.¹⁶³

2. Could Bowman Have Altered His Procedure to Avoid Patent Infringement?

Technically, Bowman was allowed to plant any non-patented product contained in the commodity seed he purchased, but Bowman intentionally removed these plants by applying glyphosate-based herbicide.¹⁶⁴ Nevertheless, isolating the non-patented seed from the patented seed would be unrealistic, especially since nearly ninety-four percent of soybeans grown in Indiana at the time were herbicide resistant varieties and consequently likely protected by patent law.¹⁶⁵

Even if Bowman had not used a glyphosate-based herbicide to select for the plants containing Roundup Ready technology, he would have been prohibited from using the defense of patent exhaustion.¹⁶⁶ Bowman was conscious of the prevalence of herbicide-resistant soybeans planted within the state and, in fact, regularly purchased patented soybeans himself.¹⁶⁷ Therefore, he purchased the commodity seed with knowledge that a majority of the seed would contain the Roundup Ready trait.¹⁶⁸ Moreover, Bowman would not have applied a glyphosate-based fertilizer that could potentially kill the entire crop unless he anticipated the majority of the commodity seed was resistant to glyphosate herbicide.¹⁶⁹

Given Bowman's previous purchases of Roundup Ready soybeans and subsequent execution of a license agreement for each purchase, he was aware that the patented product sold to the grain elevator as a commodity could not be saved by the farmer for replanting.¹⁷⁰ Therefore regardless of the herbicide chemistry Bowman used, by planting the commodity seed, Bowman was

163. *See id.* at 1766–67 (indicating that Bowman could resell the patented soybeans, consume the beans himself, or feed the seed to animals without restriction by Monsanto).

164. *See id.*

165. *See* Monsanto Co. v. Bowman, 657 F.3d 1341, 1345 (Fed. Cir. 2011).

166. *See Bowman*, 133 S. Ct. at 1766 (noting that the doctrine of patent exhaustion does not confer the right to Bowman to make additional patented soybeans without Monsanto's permission).

167. *Bowman*, 657 F.3d at 1345.

168. *See id.*

169. *See Bowman*, 133 S. Ct. at 1769 (“[Bowman] purchased beans from a grain elevator anticipating that many would be Roundup Ready; applied a glyphosate-based herbicide in a way that culled any plants without the patented trait . . .”).

170. *Bowman*, 657 F.3d at 1344–45.

knowingly and intentionally making copies of patented product and infringing on Monsanto's patent for Roundup Ready technology.¹⁷¹

Even if Bowman had not "selected" for the patented product and instead used an alternative chemistry, Bowman was still aware that the majority of the commodity seed contained patented product that, per the License Agreement, could not be replanted.¹⁷² Realistically, Bowman used a glyphosate-based herbicide because of its convenience and efficiency and would be unwilling to switch chemistries,¹⁷³ especially considering the remainder of his first-crop soybeans were glyphosate resistant and could be sprayed with glyphosate-based herbicide.¹⁷⁴

3. Planting Commodity Seed: A Practice of the Past

Bowman raised a policy argument that Monsanto should require its patented product to be kept separate, even at the grain elevator, or otherwise Monsanto retains a monopoly to control not only its patented product but other non-patented products incorporated with the undifferentiated commodity seed.¹⁷⁵ Bowman used this policy argument as justification for the application of the doctrine of patent exhaustion to the situation where farmers purchase and plant commodity seed.¹⁷⁶ Nevertheless, purchasing and planting commodity seed as a low-cost alternative to purchasing from a seed dealer has become a relic of the past.¹⁷⁷ In 2013, considering that ninety-three percent of all soybeans planted in the United States were herbicide-resistant or herbicide-tolerant varieties, it would be virtually impossible for a farmer to purchase commodity seed from a grain elevator that did not contain patented product.¹⁷⁸

171. *See id.* at 1348 ("Even if Monsanto's patent rights in the commodity seeds are exhausted, such a conclusion would be of no consequence because once a grower, like Bowman, plants the commodity seeds containing Monsanto's Roundup Ready® technology and the next generation of seed develops, the grower has created a newly infringing article.").

172. *See Bowman*, 133 S. Ct. at 1769.

173. ERS Bulletin EIB-11, *supra* note 71, at 9–14. Herbicide-tolerant soybeans make weed control simpler and less time consuming, so farmers can control more weeds effectively. *Id.* In addition, herbicide-tolerant soybeans allow for reduced pesticide applications. *Id.*

174. *See Bowman*, 657 F.3d at 1345–46.

175. *See Bowman*, 133 S. Ct. at 1768; *Monsanto Co. v. Bowman*, 686 F. Supp. 2d 834, 837 (S.D. Ind. 2009).

176. *See Bowman*, 686 F. Supp. 2d at 837.

177. *See Bowman*, 133 S. Ct. at 1768 (stating the commodity seed purchased by Bowman was intended for consumption, and the normal practice is for farmers to purchase commodity seed for this purpose).

178. Nat'l Agric. Statistics Serv., *Genetically Engineered Varieties of Corn, Upland Cotton, and Soybeans, by State and for the United States, 2000–13*, U.S. DEP'T OF AGRIC. (July 8, 2013), <http://www.ers.usda.gov/data-products/adoption-of-genetically-engineered-crops-in-the-us.aspx>.

Farmers may see hope on the horizon since the patent for Roundup Ready soybeans expired in 2014.¹⁷⁹ In addition, Monsanto has stated that farmers can start saving seed from Roundup Ready varieties purchased following the expiration of the patent.¹⁸⁰ However, farmers are permitted to save seed only for varieties developed by Monsanto breeders, whereas other varieties, or even Monsanto varieties licensed from a third party, may have variety patents that restrict the farmers' ability to save seed.¹⁸¹

Additionally, Monsanto's Genuity[®] Roundup Ready 2 Yield[®] trait technology (Roundup Ready 2) is the second-generation Roundup technology that entered the market in 2009.¹⁸² In fact, a search of Monsanto's lineup of soybean products only includes the Roundup Ready 2 soybean varieties.¹⁸³ The patents for Roundup Ready 2 soybeans¹⁸⁴ do not expire for a decade or more.¹⁸⁵ Consequently, the continued purchase and planting of patented product will ensure the presence of patented product sold to grain elevators, and thus, commodity seed, as undifferentiated seed, will continue to include patented product.¹⁸⁶ As long as commodity seed includes patented seed, which by law cannot be copied, a farmer's ability to plant commodity seed is eliminated.¹⁸⁷

Perhaps this result is ultimately not bad for farmers. As technology becomes more advanced, new varieties are produced with better insertion events that optimize yield.¹⁸⁸ In addition, herbicide-resistant crops have

179. See U.S. Patent No. 5,352,605 (filed Oct. 28, 1993); U.S. Patent No. RE39,247 E (filed July 18, 2003).

180. *Roundup Ready Soybean Patent Expiration*, MONSANTO, <http://www.monsanto.com/newsviews/pages/roundup-ready-patent-expiration.aspx> (last visited June 4, 2014).

181. *Id.*

182. *Id.*

183. *Soybean Seeds*, MONSANTO, <http://www.monsanto.com/products/Pages/soybean-seeds.aspx> (last visited June 6, 2014).

184. *Product Patents: Soybeans*, MONSANTO, <http://www.monsanto.com/products/Pages/product-patents.aspx> (last visited June 6, 2014) (indicating that Monsanto's Genuity Roundup Ready 2 Yield Soybean varieties are protected by one or more of the following U.S. Patents Nos.: 5,717,084; 5,728,925; 6,051,753; 6,660,911; 6,949,696; 7,141,722; 7,608,761; 7,632,985; 8,053,184; RE39247).

185. *Roundup Ready Soybean Patent Expiration*, *supra* note 180.

186. See *Monsanto Co. v. Bowman*, 657 F.3d 1341, 1345 (Fed. Cir. 2011) (noting that Monsanto's Technology Agreement permits the grower to sell seed to grain elevators as a commodity or to use the grain for feed).

187. See *Bowman v. Monsanto Co.*, 133 S. Ct. 1761, 1766 & n.3 (2013) (finding that when Bowman reproduced Monsanto's patented product, whether purchased from a grain elevator or a Monsanto authorized company, the doctrine of patent exhaustion did not protect him from patent infringement).

188. ERS Bulletin EIB-11, *supra* note 71, at 9 n.4 (stating the decreased yield that occurred in early varieties of herbicide-tolerant crops was eliminated by introducing the genes into higher yielding cultivars).

reduced herbicide use and allowed for application of herbicides that are more effective, less toxic, and cheaper than other herbicides.¹⁸⁹ Thus, herbicide-resistant crops have also impacted farmers' bottom-lines through reduced costs and increased income. Moreover, GE crops have reduced input costs associated with machinery, fuel, and chemical usage.¹⁹⁰ The environment has also benefited through reduced pesticide applications resulting in less chemical runoff and lower pesticide residues.¹⁹¹

Additionally, better weed control has allowed greater implementation of reduced-tillage and no-till systems¹⁹² that improve soil quality and reduce soil loss.¹⁹³ Therefore, while a farmer may be paying more for patented seed, that seed provides many benefits, and, considering that ninety-four percent of all soybeans planted are herbicide-resistant varieties, farmers obviously believe this benefit is worth the price.¹⁹⁴

Even if Bowman could have purchased lower-cost commodity seed free of any patented product, he would likely benefit instead from planting the higher priced, herbicide-resistant patented seed for his second-crop or "double-crop" soybeans.¹⁹⁵ The second-crop soybeans typically have a lower production potential and profitability.¹⁹⁶ Moreover, second-crop soybeans benefit from the flexibility and efficiency of herbicide-resistant seed.¹⁹⁷ For example, farmers' ability to use reduced tillage or no-till systems "allows additional time for planting, growing, and harvesting a second crop."¹⁹⁸ Therefore, when planting patented product, farmers can plant the double-crop soybeans sooner, optimizing growing conditions and increasing yield potential.¹⁹⁹

189. Qaim, *supra* note 14.

190. *Id.*

191. *Id.*

192. *Tillage Type Definitions*, CONSERVATION TECH. INFO. CTR., <http://www.ctic.purdue.edu/resourcedisplay/322/> (last visited June 6, 2014). No-till means "[t]he soil is left undisturbed from harvest to planting except for strips up to [one-third] of the row width (strips may involve only residue disturbance or may include soil disturbance)." *Id.* Reduced tillage means "[f]ull-width tillage . . . involving one or more tillage trips which disturbs all of the soil surface and is performed prior to and/or during planting. There is 15–30 percent residue cover after planting . . ." *Id.*

193. Qaim, *supra* note 14.

194. See ERS Bulletin EIB-11, *supra* note 71, at 8 ("Farmers are more likely to adopt new practices and technologies if they expect to benefit from them.").

195. See Brookes & Barfoot, *supra* note 6, at 190 (noting that second-crop soybeans are "facilitated substantially by the ease of management" of the herbicide-tolerant patented soybeans).

196. See *Bowman v. Monsanto Co.*, 133 S. Ct. 1761, 1765 (2013) (stating that Bowman considered the second-crop soybeans as "risky").

197. Brookes & Barfoot, *supra* note 6, at 190.

198. *Id.*

199. See *id.*

Nevertheless, Bowman claimed he would be negatively impacted if his ability to plant the lower-cost commodity seed was eliminated.²⁰⁰ Bowman's policy argument on the surface appears justified.²⁰¹ Monsanto, as the patent holder, seems to be granted a monopoly over not only its patented product, but also a majority of the soybean crop.²⁰² Yet, Bowman's policy argument falls apart when considering the benefits Bowman received from planting the commodity seed, which was essentially comprised of patented Roundup Ready soybeans.²⁰³ Bowman received all the benefits of the patented product without paying the cost associated with those benefits.²⁰⁴ Furthermore, Bowman received these benefits at a price much less than the price other farmers paid for the same patented product.²⁰⁵

Moreover, Bowman obviously desired the benefits of the patented product because he applied glyphosate-based herbicide to his second-season crop to specifically select for the patented plants.²⁰⁶ Basically, Bowman wanted authority to purchase patented product at a low cost, plant the patented soybeans, repeatedly copy the patented seed, save the copies for successive plantings, and sell a portion of his harvest without compensating the patent holder, Monsanto.²⁰⁷ No policy is served by allowing Bowman to entirely circumvent the principles of patent law.²⁰⁸

200. *See* *Monsanto Co. v. Bowman*, 686 F. Supp. 2d 834, 836–37 (S.D. Ind. 2009) (“As Bowman points out, Monsanto’s domination of the soybean seed market, combined with the regeneration of the Roundup Ready® trait and the lack of any restriction against the mixing of soybeans harvested from a Roundup Ready® crop from those that are harvested from a crop that was not grown from Roundup Ready® seed, has resulted in the commodity soybeans sold by grain dealers necessarily carrying the patented trait, thereby eliminating commodity soybeans as a low cost (but higher risk) source for planting.”).

201. *Id.* at 837.

202. *Id.*

203. *Bowman v. Monsanto Co.*, 133 S. Ct. 1761, 1765 (2013).

204. *See id.* at 1767 (observing Monsanto received no reward from Bowman’s annual production and sale of his second-season crop of Roundup Ready soybeans).

205. For example, Monsanto’s 2014 price list for Roundup Ready 2 Soybeans includes prices from \$51.00 to \$67.00 per unit for Roundup Ready 2 soybeans and from \$41.00 to \$45.00 for conventional soybeans. MONSANTO CO., ASGROW® SOYBEAN SUGGESTED RETAIL PRICE (2014). According to the commodity trading market, March 2014 soybean futures were priced at \$13.38. *Soybean Futures Quotes*, CME GROUP, <http://www.cmegroup.com/trading/agricultural/grain-and-oilseed/soybean.html> (last visited Feb. 15, 2014).

206. *Bowman*, 133 S. Ct. at 1765 (“[Bowman] . . . sprayed his fields with glyphosate to kill weeds (and any non-resistant plants), and produced a new crop of glyphosate-resistant—i.e., Roundup Ready—soybeans.”).

207. *See id.* at 1767. Following Bowman’s argument, Monsanto would receive its reward for the first sale of any patented invention. *Id.* Subsequently, any farmer or seed company could then proceed to make copies of the invention without compensating Monsanto. *Id.*

208. *See id.* (observing that if the doctrine of patent exhaustion protected Bowman’s activities, “Monsanto’s patent would provide scant benefit”).

B. Holding Necessary to Incentivize Innovation

The purpose of patent protection is to promote innovation, research, and scientific discovery, which ultimately benefits society economically and socially.²⁰⁹ In light of these goals, the scope and applicability of patent laws have been interpreted broadly to accommodate changing technology and new and unforeseen inventions.²¹⁰ These goals provide the foundation for the application of the patent exhaustion doctrine only to the particular item sold.²¹¹ When a purchaser copies the patented article, the doctrine of patent exhaustion becomes inapplicable to protect the rights of the patent holder.²¹²

If the doctrine of patent exhaustion did apply, the patent holder would be compensated for its patent only when the first patented seeds were sold.²¹³ Subsequently, farmers would not need to purchase additional patented seeds but could “make” additional product without compensating the patent holder.²¹⁴ Perhaps a farmer would occasionally want to supplement his seed with new patented product.²¹⁵ However, these periodic purchases would not incentivize the patent holder, like Monsanto, to continue funding research to develop cutting-edge technology.²¹⁶ Additionally, if Monsanto were forced to price the first sale of patented product at a level to recoup its research and development costs, no farmer would be able to afford to purchase the product.²¹⁷

Bowman’s actions are even worse because he never compensated the patent holder.²¹⁸ Monsanto was compensated by the first sale of Roundup

209. *J.E.M. Ag Supply v. Pioneer Hi-Bred Int’l*, 534 U.S. 124, 131 (2001).

210. *Id.* at 131, 135 (“A rule that unanticipated inventions are without protection would conflict with the core concept of the patent law that anticipation undermines patentability.” (internal quotation marks omitted) (quoting *Diamond v. Chakrabarty*, 447 U.S. 303, 316 (1980))).

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

212. *Id.* (“[A] second creation’ of the patented item ‘call[s] the monopoly, conferred by the patent grant, into play for a second time.’” (quoting *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 346 (1961))).

213. *Id.* at 1767.

214. *Id.*

215. *See id.* at 1765 (stating sometimes Bowman supplemented his saved seed with additional commodity seed purchased from the grain elevator).

216. *See Corporate Profile*, MONSANTO, <http://www.monsanto.com/investors/Pages/corporate-profile.aspx> (last visited June 6, 2014) (noting that Monsanto invested more than \$1.5 billion last fiscal year on research and development).

217. *See Sheff*, *supra* note 151, at 243. If the doctrine of patent exhaustion did not apply, “Monsanto might only be able recoup [sic] its investments in Roundup-Ready technology by selling its first generation of seeds to individual farmers for thousands (millions?) of dollars per bag.” *Id.*

218. *See Bowman*, 133 S. Ct. at 1765.

Ready soybeans, which were then sold to the grain elevator.²¹⁹ Yet, Monsanto was not compensated when Bowman purchased from the grain elevator the commodity seed containing copies of Monsanto's patented traits.²²⁰ In fact, Bowman purchased this seed specifically because it was cheaper than purchasing patented product from an authorized dealer.²²¹ Bowman sprayed his plants grown from the commodity seed with glyphosate-based herbicide to select for the patented product, saved some of this seed for the next season, and supplemented with additional commodity seed purchases when necessary.²²² In addition, Bowman continued this process for eight seasons.²²³ Therefore, Bowman received the benefit of the patented product for eight years of second season or "double-crop" soybeans without any compensation to the patent holder.²²⁴

In this scenario, Monsanto spends valuable time, money, and other resources on developing desirable patented soybean seed without receiving any reward from Bowman.²²⁵ If Monsanto is not compensated for its invention, what would incentivize Monsanto to continue developing new patented product?²²⁶ How can the goal of promoting innovation be achieved when Monsanto has no incentive to invent and especially share its invention with society?²²⁷ While Monsanto's product may be more expensive than other available products or previously produced non-patented seed, Monsanto is free to charge the price that the market can sustain.²²⁸ Moreover, purchasers are free to purchase other soybean seed, patented or non-patented, from Monsanto or other seed dealers.²²⁹ However, a farmer who desires a superior product should expect to pay a price proportional to the benefits received.²³⁰

219. *See Monsanto Co. v. Bowman*, 657 F.3d 1341, 1345 (Fed. Cir. 2011) (noting that Monsanto's License Agreement authorizes farmers to sell the progeny of the original patented product to grain elevators as a commodity).

220. *See Bowman*, 133 S. Ct. at 1765.

221. *See id.*

222. *Id.*

223. *Id.*

224. *See id.*

225. *See Monsanto Co. v. Bowman*, 686 F. Supp. 2d 834, 837 (S.D. Ind. 2009).

226. *See Bowman*, 133 S. Ct. at 1767 ("The exhaustion doctrine is limited to the 'particular item' sold to avoid just such a mismatch between invention and reward.").

227. *See U.S. CONST.* art. I, § 8, cl. 8 ("To promote the Progress of Science and the useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.").

228. *Monsanto Co. v. McFarling*, 302 F.3d 1291, 1299 (Fed. Cir. 2002).

229. *Id.* at 1298.

230. *See id.*

C. *Monsanto's Technology Agreement—Mutual Benefits*

Monsanto, or an authorized company, sells patented seed conditioned upon the Technology Agreement, which restricts farmers to growing a crop for a single season.²³¹ Restrictive licenses are legal as long as the condition is reasonably within the reward the patentee expects to receive.²³² Monsanto's Technology Agreement has been found to be a valid and legal restriction of the sale of patented seed.²³³

While Monsanto conditioned the purchase of patented seed on the farmers planting only a single crop season without saving seed, the farmer was not restricted from purchasing different seed in subsequent seasons.²³⁴ “Monsanto has a right to exclude others from making, using, or selling its patented plant technology, and its no replant policy simply prevents purchasers of the seeds from using the patented biotechnology when that biotechnology makes a copy of itself.”²³⁵ Therefore, “[t]his restriction . . . is a valid exercise of its rights under the patent laws.”²³⁶

Monsanto realized that its patented seed was most useful when a farmer could plant the patented product and harvest the progeny seeds to sell as a commodity.²³⁷ Therefore, Monsanto provides a license to farmers to “make” additional patented product, so long as the farmer only sells the seed as a commodity and does not save any seed for planting.²³⁸ The license agreement provides a means for both the farmer and the patent holder to benefit from the patented product.²³⁹

While Bowman did not sign a license agreement when purchasing commodity seed, Monsanto's Technology Agreement still limits Bowman's use of the seed.²⁴⁰ When farmers sell seed to the grain elevator, no unconditional sale of the patented technology occurs.²⁴¹ The farmer cannot convey to the grain elevator a right that he does not possess himself.²⁴²

231. *Monsanto Co. v. Scruggs*, 459 F.3d 1328, 1333 (Fed. Cir. 2006); *see also Bowman*, 133 S. Ct. at 1764.

232. *Mallinckrodt, Inc. v. Medipart, Inc.*, 976 F.2d 700, 704–05 (Fed. Cir. 1992) (quoting *United States v. Gen. Elec. Co.*, 272 U.S. 476, 489 (1926)).

233. *See McFarling*, 302 F.3d at 1298–99.

234. *Id.* at 1298.

235. *Scruggs*, 459 F.3d at 1340 (citation omitted).

236. *Id.*

237. *See Bowman v. Monsanto Co.*, 133 S. Ct. 1761, 1768 (2013).

238. *See id.*

239. *See id.*

240. *See Monsanto Co. v. Bowman*, 686 F. Supp. 2d 834, 839 (S.D. Ind. 2009) (noting that Monsanto's License Agreement specifically excludes planting progeny seed, so no right could be conferred to Bowman).

241. *Id.*

242. *Id.*

Therefore, the grain elevator did not have the right to plant seed containing the patented trait and could not convey that right to Bowman.²⁴³ Accordingly, both the Technology Agreement and patent law, through prohibiting a purchaser from making a patented product, restrict Bowman's ability to plant commodity seed containing patented product.²⁴⁴ Bowman was free to purchase different seed from another seed dealer,²⁴⁵ perhaps seed that would have been cheaper,²⁴⁶ but was restricted from planting patented product without appropriately compensating the patent holder.²⁴⁷

D. Self-Replicating Technology

Self-replicating technologies complicate the application of patent law and the overall purpose of promoting innovation.²⁴⁸ Formerly only a theory of science fiction,²⁴⁹ self-replicating technologies are common in certain industries and, as a result of scientific advancement and innovation, are becoming more complex and dynamic than ever before.²⁵⁰ The application of the doctrine of patent exhaustion for self-replicating technologies was questioned after the Supreme Court in *Quanta Computer, Inc. v. LG Electronics, Inc.*²⁵¹ held that "[t]he authorized sale of an article that substantially embodies a patent exhausts the patent holder's rights and prevents the patent holder from invoking patent law to control postsale use of the article."²⁵²

Bowman tried to capitalize on this uncertainty following *Quanta* and argued the doctrine of patent exhaustion applies to patented soybeans.²⁵³ Bowman claimed that each seed sold "substantially embodied" subsequent generations of seed, and, therefore, a licensed farmer's sale of progeny seed involves an authorized, unconditional sale of the patented soybeans.²⁵⁴ Consequently, that unrestricted sale exhausts the patent as to those patented

243. *Id.*

244. *Monsanto Co. v. Bowman*, 657 F.3d 1341, 1347 (Fed. Cir. 2011).

245. *See Monsanto Co. v. McFarling*, 302 F.3d 1291, 1298 (Fed. Cir. 2002) (recognizing the option of over two hundred commercial soybean products, including herbicide-tolerant varieties).

246. *See Monsanto Co. v. Scruggs*, 459 F.3d 1328, 1333 (Fed. Cir. 2006) (observing that according to Monsanto's License Agreement, farmers are required to pay a technology fee when purchasing patented seed).

247. *See Bowman*, 657 F.3d at 1347–48.

248. Sheff, *supra* note 151, at 231.

249. *Id.* at 230.

250. *See Bowman v. Monsanto Co.*, 133 S. Ct. 1761, 1769 (2013).

251. *Quanta Computer, Inc. v. LG Elecs., Inc.*, 553 U.S. 617, 617 (2008).

252. *Id.* at 638. *See also* Kevin Rodkey, *Exhaustion and Validity of Single-Use Licenses for Transgenic Seeds in the Wake of Quanta v. LG Electronics*, 19 FED. CIR. B.J. 579, 596 (2010); Sheff, *supra* note 151, at 239.

253. *Monsanto Co. v. Bowman*, 657 F.3d 1341, 1346 (Fed. Cir. 2011).

254. *See id.*; *Monsanto Co. v. Bowman*, 686 F. Supp. 2d 834, 838 (S.D. Ind. 2009).

soybeans.²⁵⁵ Bowman advocated, under *Quanta*, for a broad application of the doctrine of patent exhaustion that would generally apply to self-replicating technologies.²⁵⁶

Nevertheless, Bowman's broad interpretation of the holding in *Quanta* is of little consequence.²⁵⁷ A farmer's sale of progeny seed is expressly restricted by Monsanto's Technology Agreement.²⁵⁸ Therefore, the transaction is not an authorized unconditional sale that exhausts Monsanto's patent but is only authorized when conditioned upon that seed not being planted.²⁵⁹ Without an unrestricted sale, the doctrine of patent exhaustion is not implicated, and, consequently, the interpretation of *Quanta* is irrelevant.²⁶⁰

Moreover, previous patent infringement cases involving GE soybean seed support this conclusion.²⁶¹ Purchasing patented seed from Monsanto involves a valid, restricted sale,²⁶² and the newly grown and harvested seed, authorized by the license agreement, does not implicate the doctrine of patent exhaustion because those seeds were never purchased from the patent holder.²⁶³ Thus, whether the purchased seed "substantially embodies" the new seed or not, the doctrine of patent exhaustion does not apply for a restricted sale.²⁶⁴

Even unrestricted sales do not confer the right to make copies simply because the technology is self-replicating.²⁶⁵ If Monsanto's patent rights were exhausted, Bowman still does not have the right to copy the patented product, creating a newly infringing article.²⁶⁶ Ultimately, "[t]he fact that a patented technology can replicate itself does not give a purchaser the right to use replicated copies of the technology."²⁶⁷ Patent holders whose product naturally

255. *Bowman*, 686 F. Supp. 2d at 838.

256. *Bowman*, 657 F.3d at 1346.

257. *Bowman*, 686 F. Supp. 2d at 839.

258. See *Bowman v. Monsanto Co.*, 133 S. Ct. 1761, 1764 (2013); *Monsanto Co. v. Scruggs*, 459 F.3d 1328, 1333 (Fed. Cir. 2006); *Monsanto Co. v. McFarling*, 302 F.3d 1291, 1293 (Fed. Cir. 2002).

259. See *Bowman*, 686 F. Supp. 2d at 839.

260. See *id.* Unlike *Quanta*, no unconditional sale occurred and the grain elevator "had no right to plant the soybeans and could not confer such a right on Bowman." *Id.*

261. See, e.g., *Scruggs*, 459 F.3d at 1336; *McFarling*, 302 F.3d at 1299.

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

263. *McFarling*, 302 F.3d at 1299.

264. *Monsanto Co. v. Bowman*, 657 F.3d 1341, 1348 (Fed. Cir. 2011). The court disagreed with Bowman's *Quanta* argument "because nothing in the record indicates that the 'only reasonable and intended use' of commodity seed is for replanting them to create new seed." *Id.* (quoting *Quanta Computer, Inc. v. LG Elecs., Inc.*, 553 U.S. 617, 631 (2008)).

265. *Id.* ("The right to use 'do[es]' not include the right to construct an essentially new article on the template of the original, for the right to make the article remains with the patentee." (quoting *Jazz Photo Corp. v. Int'l Trade Comm'n*, 264 F.3d 1094, 1102 (Fed. Cir. 2001))).

266. *Id.*

267. *Id.*

self-replicates still deserve the same protections afforded other products under patent law.²⁶⁸ Otherwise, “[a]pplying the first sale doctrine to subsequent generations of self-replicating technology would eviscerate the rights of the patent holder.”²⁶⁹ Accordingly, the right to make the patented product remains with the patent holder.²⁷⁰

The Supreme Court also did not find Bowman’s “seeds-are-special argument” convincing.²⁷¹ Yet, the Court limited its holding to Bowman’s particular situation, refusing to apply the holding to all cases involving self-replicating technology.²⁷² Nevertheless, the Court clearly indicated that in certain situations the doctrine of patent exhaustion does not protect individuals from liability for infringing on patents for self-replicating technologies.²⁷³

The factor influencing the Court’s holding in *Bowman* was that Bowman exerted a level of control.²⁷⁴ Indeed, Bowman was systematically involved in selecting the patented Roundup-Ready seed.²⁷⁵ Through planting commodity seed, spraying the soybeans with glyphosate-based herbicide, and harvesting the progeny or copies of the self-replicating technology, Bowman actively participated in making Monsanto’s patented product.²⁷⁶

Nevertheless, one can conceive of situations that would involve replication of the technology outside the purchaser’s control or incidental to the purchaser’s activities.²⁷⁷ Since the Court limited the holding in *Bowman*, determining the application of the doctrine of patent exhaustion to these situations and what level of “control” warrants infringement are unclear.²⁷⁸ However, this issue was recently discussed in *Organic Seed Growers & Trade Ass’n v. Monsanto Co.*, a case that was dismissed for lack of a justiciable case or controversy.²⁷⁹ In that case, organic farmers and other associations were seeking a declaratory judgment and Monsanto’s express waiver of any claim for patent infringement against them.²⁸⁰ These entities, which grow, use, or sell only conventional seed, were concerned that incidental contamination from

268. *Monsanto Co. v. Scruggs*, 459 F.3d 1328, 1336 (Fed. Cir. 2006).

269. *Id.*

270. *Bowman*, 657 F.3d at 1348 (quoting *Jazz Photo Corp.*, 264 F.3d at 1102).

271. *Bowman v. Monsanto Co.*, 133 S. Ct. 1761, 1768–69 (2013).

272. *Id.* at 1769.

273. *See id.*

274. *Id.* at 1768–69.

275. *Id.* at 1769.

276. *Bowman*, 133 S. Ct. at 1769.

277. *Id.*

278. *Id.*

279. *See Organic Seed Growers & Trade Ass’n v. Monsanto Co.*, 718 F.3d 1350, 1352 (Fed. Cir. 2013).

280. *Id.* at 1352, 1354.

transgenic seed would subject them to patent infringement suits from Monsanto.²⁸¹

Monsanto explicitly contended that it would not take legal action against growers whose fields inadvertently contained trace amounts of patented product.²⁸² However, the threshold requirement of “trace” or “minimal” quantities was not defined.²⁸³ Is the limit one percent, as suggested by the organic farming organizations?²⁸⁴ Monsanto did not contest this threshold, yet offered no firm, enforceable limit.²⁸⁵ Moreover, courts have determined that *de minimus* or trace amounts, or even one molecule, of a patented product can be construed as infringement.²⁸⁶ While Monsanto may be judicially estopped from later adopting a contrary position in a case involving the same patents as those in *Organic Seed Growers*,²⁸⁷ that fact provides little guidance to individuals concerned about infringing the patents of the many other self-replicating technologies.

Though there is no clear guidance, the decision, as stated above, will likely be governed by the issue of control.²⁸⁸ Indeed, the Court in *Bowman* emphasized that patent exhaustion provides no protection when an individual, like Bowman, intentionally makes copies of the patented product.²⁸⁹ Moreover, Monsanto, as the patent holder, was deprived of the reward provided under patent law.²⁹⁰ In contrast, organic farmers exert substantial effort to control the integrity of their system and avoid contamination by GE crops.²⁹¹ In fact, organic farmers must take precautions to avoid contamination in order to maintain organic certification.²⁹² Despite the efforts of organic farmers,

281. *Id.* at 1353.

282. *Id.* at 1357–58.

283. *See id.* at 1358.

284. *Organic Seed Growers*, 718 F.3d at 1358.

285. *Id.* Indeed, Monsanto resisted clarification of “whether it would assert its patents against a conventional grower who inadvertently uses or sells *greater* than trace amounts of modified seed, but who, for example, does not make use of the Roundup Ready trait by spraying the plants with glyphosate.” *Id.* at 1359.

286. *See Abbott Labs. v. Sandoz, Inc.*, 566 F.3d 1282, 1299 (Fed. Cir. 2009); *SmithKline Beecham Corp. v. Apotex Corp.*, 403 F.3d 1331, 1339–40 (Fed. Cir. 2005); *Embrex, Inc. v. Serv. Eng’g Corp.*, 216 F.3d 1343, 1349–52 (Fed. Cir. 2000).

287. *Organic Seed Growers*, 718 F.3d at 1358.

288. *Bowman v. Monsanto Co.*, 133 S. Ct. 1761, 1769 (2013).

289. *Id.*

290. *Id.*

291. *Organic Seed Growers*, 718 F.3d at 1360. Organic farming operations take precautions such as testing seeds for transgenic traits and creating buffer or set-back zones between their farmers and neighbor’s farmers containing GE crops. *Id.* at 1353–54.

292. *Id.* at 1360.

contamination still occurs.²⁹³ Indeed, the Supreme Court has recognized the risk of “gene flow” from GE crops into conventional crops.²⁹⁴

While the organic farming organizations in *Organic Seed Growers* had not sustained greater than trace contamination, an organic farmer who exercises the utmost control and precaution in limiting contamination by GE crops, yet still experiences greater than trace contamination, should not be liable for patent infringement.²⁹⁵ Although contamination at greater than trace amounts in this type of situation is currently not highly likely to occur,²⁹⁶ the risk increases as GE crops become more prolific.²⁹⁷ Nevertheless, an organic farmer has a responsibility to limit contamination²⁹⁸ but cannot reasonably be expected to eliminate all contamination, or even greater than trace amounts of contamination in certain situations.²⁹⁹ Moreover, an organic farmer would prefer to eliminate all contamination from GE crops but, due to the nature of contamination by wind-blown pollen and gene-flow, probably cannot.³⁰⁰

In spite of this contamination, the patent holder is not deprived of the reward provided by patent law because the organic farmer did not purchase GE crops, did not apply Roundup herbicide, and was not intentionally trying to create copies of the patented product.³⁰¹ Therefore, each situation of possible infringement involving self-replicating technologies should be determined on the basis of how much the individual controls the system as well as the inadvertent nature of any infringement.³⁰²

CONCLUSION

In the agriculture industry, the self-replicating nature of GE seed complicates the application of the doctrine of patent exhaustion and the determination of a patent holder’s rights under patent law. The Supreme Court examined this issue in *Bowman* and correctly concluded the doctrine of patent

293. *Organic Seed Growers & Trade Ass’n v. Monsanto*, 851 F. Supp. 2d 544, 548 (S.D.N.Y. 2012). Despite efforts to control contamination, “some unlicensed—and unintended—use of transgenic seeds is inevitable. Like any other seeds, transgenic seeds may contaminate non-transgenic crops through a variety of means, including seed drift or scatter, crosspollination, and commingling via tainted equipment during harvest or post-harvest activities, processing, transportation, and storage.” *Id.*

294. *Monsanto Co. v. Geertson Seed Farms*, 130 S. Ct. 2743, 2754–55 (2010).

295. *See Organic Seed Growers*, 718 F.3d at 1356 (citing *Bowman*, 133 S. Ct. at 1769).

296. *Id.* at 1359.

297. *Id.* at 1357.

298. *Id.* at 1360.

299. *See Organic Seed Growers & Trade Ass’n v. Monsanto*, 851 F. Supp. 2d 544, 548 (S.D.N.Y. 2012).

300. *Id.*

301. *See Organic Seed Growers*, 718 F.3d at 1359.

302. *See Bowman v. Monsanto Co.*, 133 S. Ct. 1761, 1769 (2013).

exhaustion did not apply. Regardless of where the product is purchased, the doctrine of patent exhaustion does not protect individuals who copy the patented product. Moreover, the ability of a patented product to self-replicate does not, as a result, confer the right to a purchaser to make or copy the patented product.

Accordingly, seed companies that own the patent rights for GE plants may, in conjunction with license agreements, restrict a farmer's use of patented GE plants. These restrictions also apply when a farmer plants commodity soybean seed that contains patented product. While the Court's decision effectively removes the farmer's option to plant and save commodity seed, or save any patented seed, it consequently supports the purpose of patent law to promote innovation and ensures the patent holder receives the reward provided for under the patent. Furthermore, protection of self-replicating technologies from patent infringement will incentivize technological development in many industries, including genetics and biotechnology.

The Court limited its holding to Bowman's particular situation, refusing to apply the holding to all cases involving self-replicating technologies. Nevertheless, the Court indicated that in certain situations the doctrine of patent exhaustion may protect an individual from liability for patent infringement. The Court's holding in *Bowman*, and ultimately any other case involving self-replicating technologies, was influenced by whether the self-replication occurred outside the individual's control or was unintentional.

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