THE ENCROACHMENT OF INTELLECTUAL PROPERTY PROTECTIONS ON THE RIGHTS OF FARMERS

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I. INTRODUCTION

Imagine a farmer walking through a huge, flourishing cornfield. The corn in the field was planted and cultivated by him. The farmer would then save this seed to either use as a source of food for himself and his livestock or as a

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source of seed for next year's crop.[1] Because of an intellectual property rights system that recognizes plants and seeds as being corporate inventions, what used to be one of this farmer's highest duties is now recognized as a crime: the right to save the seed that he or she has grown.[2] How, after all of the backbreaking work that the farmer has put into his own crops, can one say that the seed left over after harvesting the corn does not belong to the farmer? The left over seed would not belong to the farmer if intellectual property laws protected the genetic technology contained within the seed. These intellectual property laws dictate that the owner of the seed's genetic technology is also the owner of any subsequent seed produced by the harvest.[3]

Part II of this Note defines seed piracy and briefly outlines the development of government regulations that influence the seed industry, which will be followed by a brief history of the seed industry within the United States. Next, two acts of Congress, the Plant Protection Act of 1930 and the Plant Variety Protection Act of 1970 will be briefly outlined. Finally, this Note will summarize three United States Supreme Court decisions, as well as a number of other seed piracy cases, that have significantly impacted the seed industry.

Part III of this Note will analyze the United States regulations and court decisions and how they affect farmers within the United States. It will discuss how United States intellectual property law creates an environment that stimulates the growth and amplifies the power of great seed companies, which ultimately promotes the development of seed monopolies, leaving many farmers at the mercy of the major agricultural conglomerates. This Note will conclude with a brief summary of how intellectual property protections, buttressed by congressional action and court decisions, are intruding upon the rights of farmers.

II. THE NATURE OF THE SEED INDUSTRY AND PATENT PROTECTIONS FOR GENETICALLY MODIFIED ORGANISMS

A. *Seed Piracy, Government Influence, and the Genesis of the Seed Industry*

1. *Seed Piracy*

In modern farming, big agribusiness is concerned with protecting its research investments by obtaining intellectual property rights to its seed technolo-

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1. Debra L. Blair, *Intellectual Property Protection and Its Impact on the U.S. Seed Industry*, 4 DRAKE J. AGRIC. L. 297, 297 (1999).

2. VANDANA SHIVA, STOLEN HARVEST: THE HIJACKING OF THE GLOBAL FOOD SUPPLY 90 (2000) (hereinafter STOLEN HARVEST).

3. *Id.* at 90-93.

gies. The technology is then transferred to the farmer when he or she buys the seed for use during a particular season, but the technology remains the property of the company.[4] Seed piracy, also referred to as brown bagging, occurs when farmers purchase bioengineered seed, whose technology is protected by intellectual property laws, plants and cultivates it and then saves the second-generation seed (the seed harvested from the purchased seed after being cultivated) to use for subsequent seasons.[5] Seed piracy can also occur when the seed is saved by the farmer and then later sold to other farmers for future planting, rather than the farmer saving the seed to be used in the future on his own farm.[6] According to a full-page magazine advertisement taken out by Monsanto, an agribusiness giant who owns the genetically engineered variety of "Roundup Ready" soybeans, seed piracy occurs even when a farmer does not sign an agreement at the time the seed was obtained.[7] The advertisement further suggests that a farmer who has committed seed piracy may be subject to large cash settlements, legal fees, and farm and business records inspections.[8] Agribusiness companies are adamant about protecting their intellectual property and make "no apologies" when employing the legal system to defend what is theirs.[9]

2. *History of the United States Government's Involvement in the Seed Industry*

The United States government has been involved in regulating the seed industry as early as the signing of the Declaration of Independence.[10] When they initially arrived in Jamestown, English settlers learned farming techniques from the Native Americans and planted seed that had been brought with them from England.[11] In the late 1700s, colonial farmers typically harvested the seeds from the plants with the highest quality, which would be saved for planting during next

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4. *See* Rick Weiss, *Monsanto's Gene Police Raise Alarm on Farmers' Rights, Rural Tradition*, WASH. POST, Feb. 3, 1999, at A1, *available at* http://home.interkom.com/tm_info/rw90204.htm.

5. *See* R.C. Lewontin, *The Maturing of Capitalist Agriculture: Farmers as Proletarian*, in HUNGRY FOR PROFIT: THE AGRIBUSINESS THREAT TO FARMERS, FOOD, AND THE ENVIRONMENT 93, 101 (Fred Magdoff, et al. eds., 2000).

6. Drew L. Kershen, *Of Straying Crops and Patent Rights*, 43 WASHBURN L.J. 575, 605-06 (2004).

7. Lewontin, *supra* note 5, at 101.

8. *Id.*

9. DANIEL CHARLES, LORDS OF THE HARVEST: BIOTECH, BIG MONEY, AND THE FUTURE OF FOOD 187 (2001).

10. *See* JACK R. KLOPPENBURG, JR., FIRST THE SEED: THE POLITICAL ECONOMY OF PLANT BIOTECHNOLOGY, 1492-2000, 51-52 (1988).

11. Blair, *supra* note 1, at 299.

year's season.[12] Wealthier landowners would import large quantities of seeds from Europe, which would sometimes be distributed among members of agricultural clubs; thus, the seed was not available to the common farmer.[13] Under the authority of the Treasury Department, the United States Patent Office undertook the collection and distribution of seeds, plants, and agricultural statistics in 1839.[14] In 1862 Congress established the United States Department of Agriculture to circulate information on agricultural subjects as well as to allocate seeds and plants to United States farmers free of charge.[15] By the end of the nineteenth century, the government had a significant presence in the plant sciences by supporting farmers and hampering the growth of the private seed industry.[16]

3. *Development of the Seed Industry Within the United States*

With the government distributing free seed to farmers, early seed companies experienced great difficulty in establishing productive markets.[17] Driven by the concept that the seeds from the best quality plants should be saved for following planting cycles, private seed companies began to develop.[18] Between the mid-nineteenth century and the early twentieth century, early work in the field of genetic research led to some of the first plant hybrids.[19] Development and research within the seed industry began to move from the public to the private sector.[20] As more sophisticated plant-breeding techniques developed, Congress created more financial and institutional freedom for agricultural research.[21] Finally, with Congress's elimination of the distribution of free seeds to the public coupled with the development of seed hybridization, the private seed industry

12. KEITH AOKI, SEED WARS: CONTROVERSIES AND CASES ON PLANT GENETIC RESOURCES AND INTELLECTUAL PROPERTY 12-13 (2008) (hereinafter SEED WARS).

13. KLOPPENBURG, *supra* note 10, at 52-53 (stating that George Washington and Thomas Jefferson each belonged to seed exchange societies that assisted in distributing new varieties of seed between different geographic regions).

14. Blair, *supra* note 1, at 300.

15. Weiss, *supra* note 4.

16. Blair, *supra* note 1, at 302 (stating that the government had put itself into the conflicting roles of supporting farmers while hampering the growth of the private seed industry through its program of collecting and distributing free seed to farmers).

17. *See* SEED WARS, *supra* note 12, at 15-16.

18. *See* Jeremy P. Oczek, Note, *In the Aftermath of the "Terminator" Technology Controversy: Intellectual Property Protections for Genetically Engineered Seeds and the Right to Save and Replant Seed*, 41 B.C. L. REV. 627, 631-32 (2000).

19. Richard Caplan, Note, *The Ongoing Debate Over Terminator Technology*, 19 GEO. INT'L ENVTL. L. REV. 751, 752 (2007).

20. Fredrick H. Buttel & Jill Belsky, *Biotechnology, Plant Breeding, and Intellectual Property: Social and Ethical Dimensions*, 12 SCI. TECH. & HUM. VALUES 31, 33 (1987).

21. *See id.* at 33-34.

began to take form in the 1920's.[22] The hybridization of corn affected the seed industry by renewing lobbying efforts, which called for the establishment of proprietary protection for plant varieties.[23] As seed developers increased their research and development of newer and more useful plant varieties, the need for intellectual property protections to shelter the developer's innovative technologies increased.[24]

B. *Intellectual Property Protection Within the Seed Industry*

When the first Patent Act was enacted in 1979 few acted to apply for patent protection on imported or created seeds, roots, or other plant tissues that contain genetic materials.[25] The purpose of intellectual property rights and patent protections is to grant a limited monopoly over protected material in order to promote creativity and to advance competition.[26] Even following the introduction of plant hybrids, the only way to protect a plant variety was by using a form of law known as a "trade secret."[27] Initially plants were excluded from patent law for two reasons: (1) plants are products of nature, which are considered unpatentable subject matter; and (2) plants were not believed to be amenable to patent law's written description requirement.[28] Finally, in 1930, as a result of lobbying efforts, Congress passed the Plant Patent Act, which recognized plants as patentable.[29]

1. *Plant Patent Act of 1930*

The Plant Patent Act of 1930 provides patent protection for plants that reproduce asexually as well as protection for a "discovery" and for the party making the "discovery."[30] Plants that reproduce sexually, such as hybrid corn and soybeans and many other plants that reproduce by seed,[31] were intentionally omitted because it was not believed that new plant varieties could reliably repro-

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22. *See id*.
23. *Id.* at 34.
24. SEED WARS, *supra* note 12, at 30.
25. KLOPPENBURG, *supra* note 10, at 54 (stating that no one realized that the Patent Act might apply to plants and that it was unlikely that a superior plant variety would be profitable).
26. JESSE DUKEMINIER ET AL., PROPERTY 58 (6th ed. 2006).
27. A. Bryan Endres, *State Authorized Seed Saving: Political Pressures and Constitutional Restraints*, 9 DRAKE J. AGRIC. L. 323, 328 (2004).
28. Susan E. Gustad, Comment, *Legal Ownership of Plant Genetic Resources—Fewer Options for Farmers*, 18 HAMLINE L. REV. 459, 464 (1995).
29. Plant Patent Act of 1930, 35 U.S.C. § 161 (2009); Gustad, *supra* note 28, at 464.
30. 35 U.S.C. § 161 (2009).
31. Blair, *supra* note 1, at 311.

duce by seed.[32] Because most crop plants reproduce sexually and grow from seed, the Plant Patent Act of 1930 did not apply to a large number of crop plants.[33] The American Seed Trade Association lobbied for a bill to amend the Plant Patent Act of 1930 in order to have sexually reproducing species of plants included, but was ultimately unsuccessful.[34]

2. *Plant Variety Protection Act of 1970*

The Plant Variety Protection Act of 1970, unlike the Plant Patent Act of 1930, recognized sexually reproducing plants as patentable.[35] Through Certificates of Protection, or PVP certificates, issued by the United States Department of Agriculture, the Plant Variety Protection Act of 1970 provides limited protection for sexually reproducing plants if the applicant demonstrates the requirements of novelty, distinctness, uniformity, and stability.[36] A PVP certificate certifies that the holder may exclude another from selling, reproducing, importing, or exporting his variety for the next twenty years.[37]

The Plant Variety Protection Act of 1970 provides two key exemptions from its protections.[38] The first exemption granted farmers an exemption that allowed them to save, plant, and resell seed protected under the Plant Variety Protection Act to neighboring farmers so long as the farmer's primary occupation was the growing of crops for sale "other than reproductive purposes."[39] This exemption alleviated the burden on farmers and permitted them to save seed from plants protected under the Plant Variety Protection Act without having to compensate the owner of the protected plant variety.[40] The specific provision that allowed the reselling of seed to neighboring farmers was later removed by Congress in 1994.[41] Because of the saved seed exemption, every seed that a farmer saved represented one seed's worth of lost sales to a seed company.[42]

The second key exemption provided by the Plant Variety Protection Act of 1970 was a research exemption.[43] This exemption allows anyone to use seed

32. Gustad, *supra* note 28, at 464.
33. KLOPPENBURG, *supra* note 10, at 132.
34. *Id.* at 139.
35. Plant Variety Protection Act of 1970, 7 U.S.C. § 2402 (2009).
36. *Id*.
37. Plant Variety Protection Act of 1970, 7 U.S.C. § 2483 (2008).
38. Elizabeth I. Winston, *What If Seeds Were Not Patentable?*, 2008 MICH. ST. L. REV. 321, 324 (2008).
39. Plant Variety Protection Act of 1970, 7 U.S.C. § 2543 (2009).
40. Oczek, *supra* note 18, at 639.
41. SEED WARS, *supra* note 12, at 36.
42. Winston, *supra* note 38, at 325.
43. Plant Variety Protection Act of 1970, 7 U.S.C. § 2544 (2009).

that is protected by a PVP certificate to breed new varieties of seed for experimental purposes.[44] For example, a plant breeder may purchase seed protected by the Plant Variety Protection Act and use it to develop a new line, which can later be sold or apply for its own protection under the Act, without the permission of the PVP certificate holder.[45] By providing intellectual property protections for seed developers, both the Plant Protection Act of 1930 and the Plant Variety Protection Act of 1970 aided in the development of the private seed industry.[46]

3. *Utility Patent Protection*

Living organisms have long been considered ownable, such as livestock, pets, and plants growing in a garden.[47] However, under the exceptions outlined in the Plant Protection Act of 1930 and the Plant Variety Protection Act of 1970, an organism's genetic makeup, or its genotype, was not legally ownable.[48] Neither of these two acts allowed the patenting of living organisms because of the "products of nature doctrine," which states that products of nature as living things are not patentable, excluding the organism's genetic makeup from patent protection.[49]

While the Plant Patent Act and the Plant Variety Protection Act each provided necessary protections for the plant breeder and the seed industry, developers of hybrid seed pushed for even stronger intellectual property protections through the use of utility patents.[50] A utility patent is more difficult to obtain than a PVP certificate, and also offers increased protection.[51] Unlike the Plant Patent Act and the Plant Variety Protection Act, which only offer protections on individual components of a plant variety, utility patents offer protections for individual components of plants such as genes, cells, tissue cultures, and specific plant parts, in addition to the entire plant.[52] In addition to the fact that plants were viewed as natural phenomena and, therefore, ineligible for patent protection, there was an additional barrier: for a utility patent to be granted, the plant

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44. Winston, *supra* note 38, at 324-25.
45. 7 U.S.C. § 2544; Oczek, *supra* note 18, at 638-39.
46. *See* Buttel & Belsky, *supra* note 20, at 33-37.
47. SEED WARS, *supra* note 12, at 41.
48. *Id.*
49. *Id*. *See*, Diamond v. Chakrabarty, 447 U.S. 303, 309 (1980) ("The laws of nature, physical phenomena, and abstract ideas have been held not patentable"); DUKEMINIER, *supra* note 26.
50. Blair, *supra* note 1, at 315.
51. Winston, *supra* note 38, at 326.
52. Keith Aoki, *Weeds, Seeds & Deeds: Recent Skirmishes in the Seed Wars*, 11 CARDOZO J. INT'L & COMP. L. 247, 289 (2003) (hereinafter *Seeds & Deeds*).

variety must be unique, unobvious, useful, and specifically described to allow others to make and use the invention after the patent term's expiration.[53]

In 1980, the United States Supreme Court decided *Diamond v. Chakrabarty*, which held that genetically modified organisms were exempt from the products of nature doctrine.[54] Chief Justice Warren Burger, writing for the majority, reasoned that while laws of nature and physical phenomena are not patentable, genetically modified organisms are a "nonnaturally occurring manufacture."[55] The reasoning behind the majority's holding is that human agency had transformed what was once a naturally occurring organism into a man-made manufacture.[56] However, while *Chakrabarty* confirmed that a utility patent could be granted for a genetically modified organism, there still remained a question as to whether a utility patent could be granted for a plant variety.[57]

In 2001, twenty-one years after the *Chakrabarty* decision, the United States Supreme Court held in *J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred International, Inc.* that utility patents could be issued for a plant variety.[58] *J.E.M. Ag Supply* involved patented hybrid corn that had not been genetically engineered.[59] Pioneer Hi-Bred brought suit against a small Iowa seed supply company claiming that the company had infringed on its corn seed patents by purchasing seed from an authorized Pioneer Hi-Bred seed dealer and then later reselling it.[60] The seed company argued that its resale of hybrid corn was not patent infringement because Pioneer Hi-Bred's utility patents were invalid because plants were not patentable as a matter of law.[61] The Court held that Pioneer Hi-Bred's corn seed utility patents were valid and that J.E.M. Supply Inc. had infringed those patents.[62] The Court's opinion appears to state that because neither the Plant Patent Act nor the Plant Variety Protection Act precludes utility patents from being issued for plant varieties, the United States Patent and Trademark Office may extend utility patent protection to plant varieties.[63]

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53. J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int'l, Inc., 534 U.S. 124, 142 (2001); 35 U.S.C. § 101 (2009).
54. Diamond v. Chakrabarty, 447 U.S. 303, 309-10 (1980).
55. *Id.* at 309.
56. *Seeds & Deeds*, *supra* note 52, at 287.
57. Winston, *supra* note 38, at 326.
58. J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int'l, Inc., 534 U.S. 124, 127 (2009).
59. *Seeds & Deeds*, *supra* note 52, at 298.
60. J.E.M. Ag Supply, Inc., 534 U.S. at 128-29.
61. *Id.* at 129.
62. *Id.* at 145-46.
63. *Seeds & Deeds*, *supra* note 52, at 301.

C. *Seed Industry Use of Genetic Technology to Prevent Seed Piracy*

Despite the protections provided by the Plant Protection Act of 1930 and the Plant Variety Protection Act of 1970, the seed industry desired additional protections.[64] In order to prevent the loss of sales from farmers saving their own seeds and to stifle the exploitation of their biological innovations, the "terminator" technology was born.[65] In March of 1998, the United States Department of Agriculture and Delta and Pine Land Company announced the joint development and patent of this new self-policing biotechnology.[66] The patent, officially titled "Control of Plant Gene Expression," provided a tool for the agriculture industry to protect their investments.[67] The terminator technology, which applies to all species of plants and seeds, works by programming the DNA within the plant to kill its own embryos, thus creating sterile seeds.[68] When a farmer attempts to save the seeds produced by these genetically altered plants, the next generation of plants will not grow.[69] This technology is highly controversial as it forces farmers using seeds that employ this technology to buy the seeds from a seed company every year.[70] "[F]armers perceive[ ] this technology as interfering with [the] traditional and historical right[ ] to save and replant seed."[71] However, large seed companies saw terminator technology as means to "enforce commercial control over seeds."[72]

III. THE EFFECT OF GOVERNMENT REGULATION AND SEED PIRACY LITIGATION ON RURAL FARMERS

Traditionally, the process of a farmer saving seed for planting during the following year's harvest has been a fundamental principle in agriculture.[73] Seeds with desirable characteristics were selected and used the following year in order

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64. *See* KLOPPENBURG, *supra* note 10, at 139.
65. STOLEN HARVEST, *supra* note 2, at 82.
66. *Id.*
67. *See generally* Control of Plant Gene Expression, U.S. Patent No. 5,723,765 (filed June 7, 1995) (issued Mar. 3, 1998).
68. STOLEN HARVEST, *supra* note 2, at 82.
69. *Id.*
70. Hope Shand, *New Enclosures: Why Civil Society and Government Should Look Beyond Life Patents*, *in* RIGHTS AND LIBERTIES IN THE BIOTECH AGE: WHY WE NEED A GENETIC BILL OF RIGHTS 40, 42 (Sheldon Krimsky & Peter Shorett eds., 2005).
71. Oczek, *supra* note 18, at 629.
72. CHARLES, *supra* note 9, at 219.
73. Oczek, *supra* note 18, at 647.

to achieve those desired characteristics in the following generations.[74] Farmers also saved seed from one season for use in another to cut down on the expense of purchasing seed every season.[75] Through the government's broadening of intellectual property protections for seed developers, the process of seed development has become increasingly privatized.[76] Within the United States, there is currently no law that recognizes the inherent right of farmers to save seed.[77] Farming practices are continually undercut by the ever-expanding reach of intellectual property laws on genetically modified crop varieties and the aggressive legal tactics employed by seed corporations.[78]

A. *Monopolization of the Seed Industry*

Farmers historically had two powers, the power to make choices about the physical process of farm production and the power to choose what to produce.[79] Over time, big agribusiness has been extorting these choices from the farmers, forcing them into competition with large agribusiness companies who have the power to determine the price paid for farm products.[80]

"In ordinary commerce, when a good is sold the buyer takes full and complete possession, dominion, and control over that good" and, thus, has the right to resell it if he or she so chooses.[81] If sellers are allowed to limit the transfer of these rights to the buyer during the sale of the good, the market for goods would be undermined and transaction costs would increase.[82]

Within the seed industry, when a seed that is protected under a patent is sold to a particular buyer, the company or developer holding the patent retains

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74. STEPHEN NOTTINGHAM, EAT YOUR GENES: HOW GENETICALLY MODIFIED FOOD IS ENTERING OUR DIET 117 (2d ed. 2003) (noting that saving seeds allows continuous selection for yield and resistance to pests and diseases).

75. *Id*.

76. Ryan Crawford, *Did I Save My Seed For This? United States Intellectual Property Law, the Continuing Shift in Protection from Growers to Developers, and Some Potential Implications for Agriculture*, 14 SYRACUSE SCI. & TECH. L. REP. 35, 35 (2006), *available at* http://justice.syr.edu/sstlr/wp-content/uploads/did-i-save-my-seeds-for-this.pdf.

77. *See, e.g.*, Asgrow Seed Co. v. Winterboer, 513 U.S. 179, 186 (2001) (explaining that the Plant Variety Protection Act does not reserve any right to save seed because nothing elsewhere in the Act prohibits the saving of seed).

78. Peter Straub, *Farmers in the IP Wrench—How Patents on Gene-Modified Crops Violate the Right to Food in Developing Countries*, 29 HASTINGS INT'L & COMP. L. REV. 187, 212 (2006).

79. Lewontin, *supra* note 5, at 96.

80. *See id*.

81. Peter Carstensen, *Post-Sale Restraints Via Patent Licensing: A "Seedcentric" Perspective*, 16 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 1053, 1056 (2006).

82. *Id.* at 1056-57.

the right to preclude others from making a commercial use of the seed without permission.[83] The use of a patent is a tool for protecting economic self-interest, and often operates to the detriment of weaker individuals.[84]

By controlling the seed, multinational agribusiness companies are able to profit from the exploitation of genetic improvement in crop plants.[85] In recent years, many large agribusiness companies began to acquire and merge with other seed companies, further enabling them to promote and market their genetically engineered seeds.[86] These acquisitions and mergers of multinational seed companies, in order to advance their sales of genetically modified seed, could result in farmers having difficulty in obtaining traditional unmodified seed from major seed suppliers.[87]

Additionally, the Supreme Court's ruling in *J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred International, Inc.* may have provided the seed industry with motivation to consolidate.[88] By extending utility patent protection to plant varieties, seed companies now have incentive to "acquire control of basic materials, to limit access to those materials, and to seek further patent protection as a means of continuing control."[89] Larger seed companies will be more likely to possess the resources necessary to engage in research to support patent applications, further expanding their arsenal of patents, and to litigate potential infringement claims.[90]

Most of the seed industry within the United States is shared between two agribusiness giants: Monsanto and DuPont.[91] These large seed companies take advantage of financially incapacitated farm-based and start-up research operations by purchasing them for comparatively moderate prices.[92] An article published in 1986 predicted that less than forty of the four hundred Midwest seed companies would survive heightened competition brought on by consolidation.[93] Between 1995 and 1998, six substantial corporate seed giants, Monsanto,

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83. IKECHI MGBEOJI, GLOBAL BIOPIRACY: PATENTS, PLANTS, AND INDIGENOUS KNOWLEDGE 16-17 (2006).

84. *See id.* at 33.

85. NOTTINGHAM, *supra* note 74, at 113.

86. *Id.* at 113-14.

87. *Id.* at 114.

88. Crawford, *supra* note 76.

89. Michael T. Roberts, *National AgLaw Center Research Article,* J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred International, Inc.: *Its Meaning and Significance for the Agricultural Community*, 28 S. ILL. U. L.J. 91, 115 (2003).

90. Crawford, *supra* note 76.

91. STOLEN HARVEST, *supra* note 2, at 82.

92. Blair, *supra* note 1, at 319; Vandana Shiva, *Manifesto on the Future of Seed*, *in* MANIFESTOS ON THE FUTURE OF FOOD AND SEED 76, 87 (Vandana Shiva ed., 2007) (hereinafter FOOD AND SEED).

93. Blair, *supra* note 1, at 319.

Aventis, Dow, AstraZenica, Novartis, and DuPont, gained possession or control of sixty-eight seed companies, thus evidencing the rapid unification of the seed industry.[94]

The increased consolidation of the seed industry could result in increased seed prices.[95] While a seed company has an absolute monopoly on a patented seed variety, there is no competition to drive down the price, which allows the seed company to charge the maximum possible price that the buyer is willing to pay.[96] By preventing farmers from saving seed, the seed industry prevents the reduction of demand for seed, which allows seed companies to continue charging high prices.[97]

B. *Genetic Erosion of Plant Diversity*

At present, there are approximately seven thousand species of edible plants that have been farmed and used for food.[98] Many of these edible plants are the result of farmers working in cooperation with nature to develop crops suitable for diverse climates and cultures.[99] These improvements in plants genetics occurred over a period of ten thousand years, where farmers would exchange types of seed as well as knowledge of how to work the seed.[100] Currently, the future and diversity of plant and seed varieties are in danger as a result of homogenization brought on by an increase in intellectual property rights that restrict access to genetic resources.[101]

Genetic erosion occurs when the agricultural industry becomes dependent upon a small number of specific crop species.[102] Traditionally, advances in plant breeding occurred when farmers guaranteed diverse plant genetics through expanding the characteristics of plant varieties through years of experimentation and the creation of new varieties.[103] The enforcement of intellectual property protections for seeds limits access to genetic resources that are necessary for

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94. Crawford, *supra* note 76.

95. Brief for American Corn Growers Association & National Farmers Union as Amici Curia Supporting Petitioners at 1, J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int'l, Inc., 534 U.S. 124 (2001) (No.99-1996), 2001 WL 490944 (hereinafter Brief for the Petitioner).

96. Roberts, *supra* note 89, at 115.

97. Crawford, *supra* note 76.

98. STOLEN HARVEST, *supra* note 2, at 79.

99. *Id.*

100. FOOD AND SEED, *supra* note 92, at 77.

101. *See* Peter J. Goss, Comment, *Guiding the Hand That Feeds: Toward Socially Optimal Appropriability in Agricultural Biotechnology Innovation*, 84 CAL. L. REV. 1395, 1399 (1996).

102. Roberts, *supra* note 89, at 113.

103. Crawford, *supra* note 76.

plant breeders to develop new varieties of plants.[104] A lack in genetic diversity of crops within a certain geographic area could result in the crops reacting similarly to drought or disease and, thus, resulting in a large-scale crop failure in the event of a far-reaching environmental disaster.[105] By reducing access to plant genetic materials and destroying genetic diversity, the seed industry makes it more difficult for farmers and breeders to produce crops that are more suitable for abrupt changes in environmental conditions.[106]

Further evidencing the agricultural disaster of genetic erosion is the use of terminator technology to prevent seeds from reproducing.[107] By allowing corporate seed monopolies to obtain patents on genetic material, intellectual property law is impeding scientific progress.[108] By patenting plants that kill their own embryos, the corporate seed companies are preventing the life-essential function of reproduction.[109]

Terminator technology poses an enormous threat to plant biodiversity.[110] The fact that this particular technology has never been tested on a large scale could be disastrous for surrounding food crops and the natural environment.[111] Plants containing the terminator technology have the potential to cross-pollinate with other non-genetically engineered crops, resulting in genetic contamination.[112] This genetic contamination could ultimately result in the unintended sterilization of open-pollinated or wild crops, effectively destroying plant reproduction entirely and threatening farmer independence.[113]

C. *Increased Litigation Between Seed Companies and Farmers*

The creation of terminator technology, as well as intellectual property protections, has taken away the farmer's traditional right to save seed.[114] These

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104. *Id.*

105. Goss, *supra* note 101, 1403.

106. *Id.* at 1422.

107. *See* Debra M. Strauss, *Defying Nature: The Ethical Implications of Genetically Modified Plants*, 3 J. FOOD L. & POL'Y 1, 22-23 (2007).

108. *Id.* at 23.

109. *Id.* at 22-23.

110. STOLEN HARVEST, *supra* note 2, at 83.

111. *Id.* at 83-84.

112. *See* FOOD AND SEED, *supra* note 92, at 79 (stating that non-genetically engineered seeds are frequently contaminated with genetically modified traits when planted in close proximity, often resulting in an immediate threat to farmers wishing to produce products free of genetic modification).

113. *See id.* at 82-83.

114. Oczek, *supra* note 18, at 629; Brief for the Petitioner, *supra* note 95, at 26 (arguing that the issuance of patents has taken away the farmer's traditional right to save seed).

developments have had both economic and social consequences.[115] An economic consequence results every time a farmer replants a saved seed, resulting in a loss of potential sale to the seed company.[116] Thus, precluding a farmer from saving seed forces the farmer to spend money on new seed every year.[117] A resulting social consequence is the trespass on a farmer's traditional and historical practice of saving seed.[118] Intellectual property protections have ultimately resulted in an increased use of gene-licensing agreements[119] and increased litigation between seed companies and farmers.[120]

Increased intellectual property protections have resulted in an increase in seed technology agreements, or seed-licensing agreements, between seed companies and farmers.[121] These agreements can limit the farmer to planting the seed for only a single harvest and prohibit the farmer from storing or selling the seed.[122] Farmers are, therefore, forced to return to the company to buy the expensive bioengineered seed yearly, which many farmers cannot afford.[123] Thus, these agreements give seed companies an enormous influence in how farmers choose to use the seed and what inputs can be used to grow the seed.[124] In some cases, if a farmer violates any clause within the agreement[125] they must pay liquidation damages an amount equal to one hundred times the technology fee for that gene, multiplied by the number of units of transferred seed, in addition to compensation for reasonable attorneys' fees.[126] Additionally, gene-licensing agreements also serve to direct post-harvest use and sale of the patented crop.[127] A portion of a standard Monsanto technology agreement read:

> In the event that the Grower saves, supplies, sells, or acquires seed for replant in violation of this Agreement and license restriction, in addition to other remedies available to the technology provider(s), the Grower agrees that damages will include a

115. Roberts, *supra* note 89, at 115.
116. *Id.*
117. Shand, *supra* note 70, at 42.
118. Brief for the Petitioner, *supra* note 95, at 26.
119. Roberts, *supra* note 89, at 116.
120. Brief for the Petitioner, *supra* note 95, at 28.
121. Crawford, *supra* note 76.
122. Roberts, *supra* note 89, at 115.
123. Sylvia Carter, *One Potato, New Potato / Farmers and Biotech Companies are Battling for Control*, NEWSDAY, Mar. 28, 1999, at A51.
124. NOTTINGHAM, *supra* note 74, at 112.
125. *Id.*
126. *Id.*
127. Brief for the Petitioner, *supra* note 95, at 25.

> claim for liquidated damages which will be based on 120 times the applicable Technology Fee.[128]

Seed companies argue that these agreements are necessary in order to protect their investment in the genetic research and development of their seed.[129] In addition to precluding seed saving and directing post-harvest use and sale of the patented crop, these agreements also have a choice of venue clause for the litigation of seed-license violations.[130] Consequently, the increase in the use of gene-licensing agreements also results in an increased litigation between seed companies and farmers.[131]

In order to enforce their licensing agreements, many seed companies are enlisting private investigators to obtain samples from the fields of farmers that have purchased that company's seed.[132] The seed licensing agreement signed by the farmer often includes a clause stating that the company has the right to visit the farmer's field, outside of his presence and without permission.[133] If a DNA analysis test reveals that the farmer has broken a term of the licensing agreement, the seed company then has the right to sue the farmer for seed piracy.[134] Seed companies also encourage whistle-blowing by sponsoring a toll-free telephone line where farmers can turn-in their neighbors for seed-piracy.[135]

There have been hundreds of legal confrontations resulting from seed companies' enforcement of gene-licensing agreements on farmers.[136] For example, Monsanto, a single corporate seed-giant, has filed more than 475 seed piracy lawsuits against farmers for violations of seed-license agreements.[137] A group of farmers in Iowa, Kentucky, and Illinois who practiced seed saving were each forced to pay fines up thirty-five thousand dollars to Monsanto.[138] Monsanto's Scott Baucum stated, "We say they can pay (either of) two royalties—$6.50 at the store or $600 in court."[139]

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128. CHARLES, *supra* note 9, at 155.
129. STOLEN HARVEST, *supra* note 2, at 92.
130. Brief for the Petitioner, *supra* note 95, at 29.
131. *See* Crawford, *supra* note 76.
132. Blair, *supra* note 1, at 327.
133. STOLEN HARVEST, *supra* note 2, at 92.
134. Weis, *supra* note 4, at A1 (explaining how one farmer is being sued, using it as an example of many similar cases).
135. STOLEN HARVEST, *supra* note 2, at 93.
136. Crawford, *supra* note 76.
137. Roberts, *supra* note 89, at 117.
138. STOLEN HARVEST, *supra* note 2, at 92.
139. Ronnie Cummins, *Food Bytes No. 13*: *Monsanto Under Attack*, (NEWS AND ANALYSIS ON GENETIC ENGINEERING & FACTORY FARMING), Oct. 31, 1998, http://www.organicconsumers.org/gelfoodByt13.htm.

The most remarkable legal battle stemming from a violation of a gene-licensing agreement is a case involving genetic drift.[140] Genetic drift occurs when proprietary genetic material finds its way to a neighboring farmer's organic field, rendering the neighboring farmer liable for patent infringement.[141] In a landmark case, Monsanto sued Percy Schmeiser of Saskatchewan, Canada for saving seeds despite the fact that he never purchased Monsanto seeds.[142] Pollen from Monsanto's Roundup Ready crops was carried by the wind from neighboring farms to Schmeiser's farm, where his crops cross-pollinated with pollen from Monsanto's genetically altered crops.[143] Monsanto was "awarded damages based on Schmeiser's" profits for that year, in addition to the "amount of technical fees for contracted use of the seed[,]"[144] which was upheld by the Supreme Court of Canada.[145] The Court reasoned "that it was irrelevant whether . . . Schmeiser took advantage" of the genetically modified seed, and it was his responsibility to destroy the seed that was windblown onto his property, not Monsanto's.[146] This case was seen as a test case for Monsanto for further prosecution of American farmers.[147] This case contains a "troubling precedent" of the North American legal trend to protect the interests of large agribusiness to the detriment of farmers.[148]

IV. CONCLUSION

In response to industrial agriculture's ever-tightening grip on the seed industry, a number of movements and initiatives whose sole purpose would be the preservation of seed, plant genetic materials, and farmers' rights must be put into action.[149] First, progress could be made through the creation of communal seed banks.[150] Seed banks operate to preserve genetic diversity by facilitating the ex-

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140. *See* SEED WARS, *supra* note 12, at 52-53.

141. Crawford, *supra* note 76.

142. *See* Monsanto Canada Inc. v. Schmeiser, [2004] 1 S.C.R. 902 ¶¶ 1, 6, 11, 2004 SCC 34 (Can.).

143. *See* Jill Sudduth, *Where the Wild Wind Blows: Genetically Altered Seed and Neighboring Farmers*, 2001 DUKE L. & TECH. REV. 0015, at ¶ 2 (May 3, 2001), http://www.law.duke.edu/journals/dltr/articles/2001dltr0015.html.

144. *Id.* at ¶ 3.

145. SEED WARS, *supra* note 12, at 49.

146. Sudduth, *supra* note 143, at ¶ 4.

147. *Id.* at ¶ 11.

148. SEED WARS, *supra* note 12, at 49.

149. FOOD AND SEED, *supra* note 92, at 100.

150. *See* Maria Victoria Stout, *Crossing the TRIPS Nondiscrimination Line: How CAFTA Pharmaceutical Patent Provisions Violate TRIPS Article 27.1*, 14 B.U. J. SCI. & TECH. L. 177, 181 (2008).

change of seeds for "research, breeding, and crop development."[151] Second, the development of an "open source" seed market would facilitate the sharing of seed and the development of new technologies.[152] An open source market would allow plant genetic resources to be made available and freely accessible to farmers.[153] An open source seed market would open doors to innovation by fostering creativity and creating a climate of scientific collaboration.[154] Finally, seed preservation and farmers rights could be preserved by the creation of political groups, similar to GRAIN and ETC Group, to promote agriculture diversity and advocate for people's control of plant genetic resources and the review of patents on seed and laws relating to farmer biopiracy.[155]

Currently, large corporate seed companies are at war with farmers. Intellectual property laws, through acts of Congress and decisions by the United States Supreme Court, serve to reinforce those laws in order to further strengthen the grip of seed monopolies on the agricultural industry. This enforcement is done to the detriment of farmers. Seed patents, used as a tool to restrict access to genetic material, result in the destruction of genetic diversity and lead to crops that are less suitable for changes in environmental conditions. Gene-licensing agreements and terminator technology, used to protect corporate investments, force farmers to return to seed companies each year in order to purchase seed for unreasonable prices. Industrial agriculture, by taking advantage of the legal system, threatens farmers with lawsuits that force them out of traditional farming practices and subject them to the whim of corporate monopolies. By reinforcing intellectual property laws through congressional action and court decisions, the traditional rights of farmers are slowly drowning in an industry dominated by corporate greed.

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151. *Id.*

152. Keith Aoki & Kennedy Luvai, *Reclaiming "Common Heritage" Treatment in the International Plant Genetic Resources Regime Complex*, 2007 MICH. ST. L. REV. 35, 61 (2007) (stating that copyrighted computer software is analogous to plant breeders' rights and patented seed, and that principles of an open source market, as used in the software industry, can be applied to plant genetic resources).

153. *See generally* FOOD AND SEED, *supra* note 100, at 95-97.

154. *See* Yann Joly, *Open Source Approaches in Biotechnology: Utopia Revisited*, 59 ME. L. REV. 385, 404 (2007).

155. *See* ETC Group—About ETC Group, http://www.etcgroup.org/en/about/ (last visited Feb. 10, 2010); GRAIN, About GRAIN, http://www.grain.org/about/ (last visited Feb. 10, 2010).