

SEED GIANTS vs. U.S. FARMERS



A REPORT BY THE CENTER FOR FOOD SAFETY & SAVE OUR SEEDS

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CENTER FOR FOOD SAFETY (CFS)

The Center for Food Safety (CFS) is a national non-profit organization working to protect human health and the environment by challenging the use of harmful food production technologies and by promoting organic and other forms of sustainable agriculture. CFS uses groundbreaking legal and policy initiatives, market pressure and grassroots campaigns to protect our food, our farms, and our environment. CFS is the leading organization fighting genetically engineered (GE) crops in the U.S., and our successful legal challenges and campaigns have halted or curbed numerous GE crops. CFS's U.S. Supreme Court successes include playing an historic role in the landmark U.S. Supreme Court *Massachusetts v. EPA* decision mandating that the EPA regulate greenhouse gases. In addition, in 2010 CFS challenged Monsanto in the U.S. Supreme Court (*Monsanto Co. v. Geertson Seed Farms*), which set key legal precedents. CFS has offices in Washington, DC, San Francisco, CA, and Portland, OR.

SAVE OUR SEEDS (SOS)

The Save Our Seeds (SOS) initiative is an extension of CFS's already successful legacy of protecting seed for future generations. Our two-fold aim is to undertake legal and policy strategies on both domestic and international levels to halt the rapid increase of seed commercialization and concentration; and to "shift the consciousness" by advancing the principle that seeds are a public good and should be part of the public domain.

TABLE OF CONTENTS

Foreword	1
Executive Summary	2
CHAPTER ONE	
Seeding Control: Corporate Takeover of Seeds	12
Brief History of Seed in the U.S.	12
<i>Farmer-Breeders</i>	
<i>Public Sector</i>	
<i>Private Sector</i>	
Brave New World: Entering a New Intellectual Property Paradigm	13
<i>The Plant Patent Act</i>	
<i>The Plant Variety Protection Act (PVPA)</i>	
Unprecedented Legal Decisions Impacting Plant Patents	15
The Role of Genetically Engineered (GE) Seeds	16
<i>A Novel Invention?</i>	
Beyond Legal Limits: Broader Implications of Present Seed Patent Regime	16
<i>Seed Industry Concentration</i>	
<i>Increased Seed Prices</i>	
<i>Reduced Seed Options & Innovation</i>	
<i>Restricting Independent Scientific Research</i>	
<i>Loss of Plant Diversity</i>	
<i>Super Weeds, Super Problem</i>	
CHAPTER TWO	
Technology Use Agreements: Farmers as Serfs	22
Expansive Scope of Technology Agreements	23
<i>Coming to a Farm Near You: Technology Agreements for Non-GE Seeds</i>	
<i>Comprehensive Bans on Seed Saving</i>	
<i>Acknowledgment of Foreseeable Transgenic Contamination</i>	
<i>This Land is Not Your Land</i>	
<i>Extreme Damages, Bankruptcy, and Controlled Judicial Review</i>	
<i>State Farmer Protection Acts</i>	

CHAPTER THREE

Dragnet: Pursuing and Prosecuting American Farmers 27
 Seed Cleaners Also Under Threat 29
 Prosecuting America’s Farmers 29
 Out-of-Court Settlements 30
 Following the Leader: Litigation by Other Seed Giants 31
 Bowman v. Monsanto Co.
 Organic Seed Growers & Trade Ass’n v. Monsanto Co.
 Association for Molecular Pathology v. Myriad Genetics, Inc.

CHAPTER FOUR

**Policy Options: Reforming the Current Seed and Plant
 Patent Regime 35**
 Amend the Patent Act So That Sexually Reproducing Plants Are Not
 Patentable Subject Matter and Amend the Plant Variety Protection Act
 (PVPA) to Exclude Such Plants from Protection Under the PVPA 36
 Authorize the Plant Variety Protection Act (PVPA) as the Exclusive Means of
 Securing Intellectual Property Protection Over Sexually Reproducing Plants 37
 Amend the Patent Act, and/or Have a Court Decide: 1) Patent Rights Exhaust
 After the First Authorized Sale; and 2) Farmers Cannot be Sued for Naturally
 Reproducing Seeds From a Patented Variety 37
 Amend the Patent Act So That Seed Saving and/or Inadvertent Possession,
 Use, or Sale of Seeds is Not Considered Infringement 38
 Legislate to Prevent Seed Giants from Shifting Liability Onto the Farmer 39
 Adopt Existing State Models for Controlling Intrusive and Aggressive
 Patent Infringement Investigations of Farmers 39
 Level the Courtroom Playing Field By Negating Seed Industry Forum
 Selection Clause 40
 Pass Federal, State, and Local Initiatives Instituting a Ban or Moratorium on
 the Growing of Genetically Engineered Crops 41
 Endnotes 42

FOREWORD



In 2003, CFS launched an investigation to determine the extent to which American farmers are impacted by litigation arising from the use of patented, genetically engineered (“GE” or “transgenic”) crops. This investigation culminated in a 2005 report, a comprehensive assessment of Monsanto Company’s use of U.S. patent law to control the use of staple crop seeds by farmers. The groundbreaking report, *Monsanto vs. U.S. Farmers*, details the results of this research, discusses the ramifications for the future of U.S. farming, and provides policy recommendations for improvement.

At that time, we documented that recorded judgments granted to Monsanto amounted to over 15 million dollars.¹ Applying its significant financial and legal resources, Monsanto has also forced farmers to pay an estimated hundreds of millions more through confidential out-of-court settlements. We have regularly documented this pernicious practice to the present day. By the end of 2012, Monsanto had received over \$23.5 million from patent infringement lawsuits against farmers and farm businesses.

As this new report discusses, farmers continue to be persecuted for issues pertaining to seed patents.

Intensifying this assault, other agrichemical corporations are poised to join Monsanto in their prosecution of U.S. farmers. *Seed Giants vs. U.S. Farmers* records the current relationship between farmers and the “seed giants,” the world’s largest agrichemical companies, which today have created a seed oligarchy. It also explains the history of seeds in the U.S. and summarizes how patent and intellectual property (IP) decisions and policies impact broader socio-economic and environmental issues.

Our newest report is timely because the U.S. Supreme Court is poised to hear legal argument in *Bowman v. Monsanto* this year (2013). The case concerns Monsanto’s prosecution of 75-year-old Indiana farmer Vernon Hugh Bowman. The company alleges that Mr. Bowman infringed upon its seed patents by purchasing and planting undifferentiated seeds from a grain elevator. Mr. Bowman’s case, one of hundreds discovered in our investigations, is a microcosm of the problem of farmer prosecution that the current system created and fosters. The Supreme Court’s upcoming decision will greatly impact the future relationship between farmers and the agrichemical companies, and, in turn, have wide-ranging ramifications for independent scientific research, the sustainability of American agriculture, and the food we eat.

EXECUTIVE SUMMARY

It is miserable for a farmer to be obliged to buy his Seeds; to exchange Seeds may, in some cases, be useful; but to buy them after the first year is disreputable.

—GEORGE WASHINGTON²



Current U.S. seed laws and policy have veered far from President George Washington’s vision of seeds and farming for this country. Seed and plant patent and intellectual property (IP) schemes not only ensure that a farmer is “obliged to buy his Seeds,” but also cause hardship through loss of autonomy, harassment, and litigation for farmers throughout the U.S. and across the globe.

In the last few decades, the U.S. has led a radical shift toward commercialization, consolidation, and control of seed ownership. Three agrichemical firms—Monsanto, DuPont, and Syngenta—now control 53 percent of the global commercial seed market.³ The top ten seed firms, with a majority stake owned by U.S. corporations, account for 73 percent.⁴ This shift has fundamentally changed farming in the U.S. Instead of continuing the his-

torical tradition of farmers having full access to seeds that they have cultivated over centuries, agrichemical corporations now own the *sine qua non* of farming—indeed, the irreplaceable element of all food—seeds.

This report recounts the history of seed and plant breeding and intellectual property policies in the U.S. and outlines how the current intellectual property regime has resulted in seed industry consolidation, rising seed prices, loss of germplasm diversity, and the strangling of scientific inquiry. It then documents lawsuits and threats of lawsuits by the largest agrichemical companies in the world against U.S. farmers for alleged infringement of seed patents. Finally, the report provides policy options that can help protect farmers and food resources as well as generate seed innovation and research through fair access to seeds and other resources.

BRIEF HISTORY OF SEED IN THE U.S.

Humans have improved plants since the dawn of agriculture. The crops grown today are the culmination of this long tradition of plant breeding. Farmers, public sector breeders, and private seed firms have all made important contributions.

FARMER-BREEDERS

Since the founding of the United States, farmers—including Native American agriculturalists—have played a critical role in developing crop varieties that form the basis of modern agriculture. Their efforts produced a rich diversity of crop varieties adapted to different regions, soil types, climates, local pests, plant diseases, and cultures. Farmers have contributed to this steady genetic improvement of crops through the simple but effective process of mass or phenotypic selection in which seeds from the healthiest and most productive plants are saved and replanted the following season. Some farmers continue to practice phenotypic selection today.⁵

America's early leaders understood that strengthening agriculture was essential to the nation's economic development. Farmers played a crucial role in this process, aided by the U.S. Patent Office.⁶ Commissioner of Patents Henry Ellsworth regarded the provision of novel plant varieties to be as much the business of the Patent Office as encouraging mechanical inventions. Beginning in 1839, Ellsworth obtained congressional funding to coordinate the collection of new crop varieties from around the world and distributed seeds to American farmers. Farmers tested these new seeds, conducted extensive breeding with them, and thereby laid the genetic foundations for American agriculture. Some of the more famous farmer-bred varieties include Red Fyfe wheat, Grimm alfalfa, and Rough Purple Chili potato.

The U.S. Department of Agriculture (USDA), founded in 1862, continued this program of germ-

plasm distribution and farmer-led breeding into the early 20th century. By the turn of the 19th century, USDA had distributed over one billion packages of seeds to farmers across the country.⁷

For centuries farmers and plant breeders fostered a diverse array of germplasm by selecting for locally adapted varieties to thrive in diverse soils, geographies, and climates.

PUBLIC SECTOR

USDA, land-grant universities, state experiment stations, and other publicly funded institutions conducted more systematic testing and breeding of new crop varieties in the 20th century. Publicly funded scientists revolutionized breeding with backcrossing, a process whereby a valuable trait (e.g., disease resistance) of a plant variety not suitable for food production is introduced into a commonly used variety to improve it.

Public sector scientists also developed the process of hybridization, including the first high-yielding hybrid corn varieties.⁸ Most major new crop varieties developed throughout the 20th century owe their origin to publicly funded agricultural research and breeding. In 1980, the share of overall U.S. crop acreage planted with public sector seed was 70 percent for soybeans and 72–85 percent for various types of wheat.⁹ The substantial yield increases in corn, cotton, and soybeans since 1930 evince the “unambiguous hegemony of public science in the field of plant breeding”¹⁰ in the 20th century.

PRIVATE SECTOR

Until recently, the private sector's chief role in the seed industry was to multiply and sell regionally adapted varieties developed in the public domain. This was done primarily by numerous, often family-owned seed firms scattered across the country.¹¹ Only in those few field crops that had been successfully hybridized (corn, sorghum, and sun-

flower) did the private sector play a more active breeding role.¹²

Agrichemical companies devote significant resources toward investigating and prosecuting farmers for alleged seed patent violations.

One major attraction of hybrid seed to private firms was that it does not breed true and thus must be purchased anew each year. Pioneer and other corn seed firms adopted hybridization techniques developed by public sector breeders and became dominant in hybrid corn beginning in the 1930s.¹³

The nascent seed industry realized the commercial implications of hybrid seeds. Thus, it began to advocate for the elimination of federal seed programs, viewed to be a barrier to potential private profit, and promoted policies to allow seed and plant patenting.

BRAVE NEW WORLD: ENTERING A NEW INTELLECTUAL PROPERTY PARADIGM

The vast majority of plant improvement in American history has been accomplished by farmers and public sector plant breeders, and these tremendous advances were made without any system of “innovation-promoting” intellectual property protection for plants. For the first two centuries of this country’s history, Congress consistently refused to authorize patents on staple food crops. However, under increasing pressure and marketing from agrichemical companies, seed patent and IP law and policies have enshrined corporate interests instead of safeguarding farmers and small, independent businesses.

THE PLANT PATENT ACT

Seed firms began pressing for a plant patent system as long ago as 1885.¹⁴ In 1930, Congress responded

with the Plant Patent Act of 1930 (PPA), which established a patent system for *asexually* propagated plants (e.g., ornamentals, fruit and nut trees, and other plants reproduced via budding, cutting and grafting).¹⁵ However, the real significance of Congress’ passage of the PPA was what it excluded. The great majority of food-producing plants—e.g., wheat, corn, rice, oats, soybeans, most vegetables, and many others—are reproduced *sexually* (via seeds). Congress, backed by farmers and the USDA, refused to permit patents on these staple food crops. This reflected the common-sense conviction that private sector entities should not be entrusted with monopoly control over the very source of our food supply.

THE PLANT VARIETY PROTECTION ACT (PVPA)

In 1970, Congress passed the Plant Variety Protection Act (PVPA). This Act empowered USDA to grant Certificates of Protection for novel sexually reproducing plant varieties grown from seed.¹⁶ The Certificates conferred exclusive marketing rights to the breeder for an 18-year term (subsequently amended to 20 years). However, the Certificates established two critical exemptions: 1) farmers must be allowed to save seeds for replanting; and 2) patented varieties must be made available to researchers.¹⁷ With these exemptions, Congress explicitly recognized that farmers and public-interest breeders were vital partners in the continuing improvement of plant varieties and enshrined in law the millennia-old right of farmers to save seeds.

LEGAL DECISIONS IMPACTING PLANT PATENTS

The critical paradigm shift came in *Diamond v. Chakrabarty*, the 1980 landmark 5-4 Supreme Court decision that held for the first time that living organisms—in this case, a genetically engineered bacterium—could be patented.¹⁸ According to the Court’s majority, because the patentee had intro-

duced new genetic material within the bacterium cell, he had produced something that was not a product of nature and was thus patentable subject matter. The *Chakrabarty* decision that living organisms should be patented is far from universally accepted.¹⁹

Nonetheless, the decision paved the way for the U.S. Patent and Trademark Office (USPTO) to decide in the 1985 case *Ex parte Hibberd* that sexually reproducing plants are patentable under the Patent Act. This allowed corporations to obtain *utility patents*, effectively a policy tool allowing control over plants as “inventions.” Utility patents (unlike PVPA certificates) allow the corporate patent holders to deny farmers the right to save and replant seed and exclude others from using any patented variety for research.²⁰ Affirming the USPTO’s practice, in 2001, the 5-4 Supreme Court decision in *J.E.M Ag Supply v. Pioneer Hi-Bred International* upheld the granting of utility patents for plants.²¹

These judicial decisions greatly expanded the scope of intellectual property rights for seeds and plants. Corporations stampeded the USPTO with over 1,800 patent submissions for genetic material of seeds and plants.²² While firms raced to patent genetic resources and plant breeding techniques, they also rapidly acquired existing seed companies. The agricultural biotechnology industry emerged through the rapid acquisition of existing seed firms by chemical and pesticide companies such as Monsanto, DuPont, Syngenta, and Dow.²³ Dozens of mergers and acquisitions ensued; at least 200 independent seed companies were bought out and consolidated from 1996-2009.²⁴

As a consequence, what was once a freely exchanged, renewable resource is now privatized and monopolized. Current judicial interpretations have allowed utility patents on products of nature, plants, and seeds, without exceptions for research and seed

saving. This revolutionary change is contrary to centuries of traditional seed breeding based on collective community knowledge and established in the public domain and for the public good.

THE ROLE OF GENETICALLY ENGINEERED (GE) SEEDS

The introduction of GE, or transgenic, crops has fundamentally altered farming for thousands of American farmers. Biotechnology firms claim comprehensive rights to GE plants by virtue of inserting single genes. The advent of genetic engineering has expedited claims for seed patents and has subsequently become a gateway to controlling seed germplasm. This shift toward market domination of GE seeds is a primary basis for the plethora of investigations and lawsuits targeting farmers.

The vast majority of the four major commodity crops in the U.S. are now genetically engineered. U.S. adoption of transgenic commodity crops has been rapid, in which GE varieties now make up the substantial majority: soybean (93 percent transgenic in 2010), cotton (88 percent), corn (86 percent), and canola (64 percent).²⁵

The two major types of GE crops are: 1) herbicide-resistant crops that enable application of one or more herbicides to kill weeds without harming the crop; and 2) insect-resistant, Bt crops that produce toxins in their tissues that kill certain pests that try to feed on them.

DRAGNET: PURSUING AND PROSECUTING AMERICA’S FARMERS

Agrichemical companies devote significant resources toward investigating and prosecuting farmers for alleged seed patent violations. Their investigations and lawsuits reflect a David versus Goliath scenario. Agrichemical companies earn billions of dollars each year, and farmers cannot possibly com-

pete against such resources. Most farmers simply cannot afford legal representation against these multi-billion dollar companies and often are forced to accept confidential out-of-court settlements.

Most major new crop varieties developed throughout the 20th century owe their origin to publicly funded agricultural research and breeding.

At present, Monsanto continues to dominate seed biotechnology, accounting for nearly 27 percent of global commercial seed sales in the world.²⁶ It also has astonishing control over seed germplasm via acquisition of a multitude of patents on both GE techniques and GE seed varieties.²⁷ Due to its dominating market position, Monsanto has led the industry in lawsuits against farmers and other agricultural stakeholders. As early as 2003, Monsanto had a department of 75 employees with a budget of \$10 million for the sole purpose of pursuing farmers for patent infringement.

As of December 2012, Monsanto had filed 142 alleged seed patent infringement lawsuits involving 410 farmers and 56 small farm businesses in 27 states,²⁸ which recently led one judge to brand the company “incredibly litigious.”²⁹ Sums awarded to Monsanto in 72 recorded judgments total \$23,675,820.99.³⁰

While Monsanto plainly leads the pack in pursuing litigation, as its patents expire, other agrichemical companies are now more aggressively enforcing their seed patents. DuPont, the world’s second largest seed company, hired at least 45 farm investigators in 2012 to examine planting and purchasing records of Canadian farmers and to take samples from their fields to send to DuPont for genetic analysis. DuPont is expanding this operation to the U.S. in 2013 and hiring approximately 35 investigators, many former police officers.³¹

TECHNOLOGY AGREEMENTS: TOOLS OF PROSECUTION

Instead of saving seed for replanting, farmers are now constrained to purchasing a combination “cropping system” comprised of high cost GE seed and the herbicide to which the seed is resistant. Yet purchasing seed comes at a cost higher than just the price of seed. Upon purchase, farmers are required to sign lengthy contracts known as “technology use agreements.” The contracts prohibit farmers from saving seeds and, among many other intrusive provisions, allow companies to access the farmers’ records held by third parties, such as the U.S. government.

In addition to these contracts, the patent holders’ strategy to prevent seed saving consists of three stages: investigations; coerced settlements; and, if that fails, litigation. This report discusses intrusive aspects of these contracts and how they are used to litigate against farmers and others in farming communities.

The story of Moe Parr, a seed cleaner in Indiana, illustrates the tactics and scope of the agrichemical industry. Seed saving requires the services of seed cleaners, who use specialized equipment to remove chaff and weed seed from harvested seed to prepare it for planting and prevent the seeding of weeds along with the crop. Monsanto sued Mr. Parr for “aiding and abetting” seed saving farmers by cleaning seeds from harvests so that farmers could save and replant. Mr. Parr did not know if the seeds he cleaned were patented or not because seed cleaners do not perform genetic tests on a customer’s seeds. The protracted legal battle caused Mr. Parr to submit to strict settlement provisions proposed by Monsanto because he could no longer afford legal representation. According to Mr. Parr, he lost almost 95 percent of his former customers, who are afraid that association with him will lead to prosecution against them as well.³²

This report also includes other stories of harassment and intimidation by seed companies. David Runyon, an Indiana corn and soybean farmer was accused of using Monsanto's patented Roundup Ready seeds, even though he purchased non-patented soybean seed from local universities. Monsanto eventually dropped its inquiry, but the protracted investigation required considerable financial resources of Mr. Runyon.

GUILTY BY GE CONTAMINATION

Transgenic crop seed can contaminate non-GE crops in numerous ways: via birds, animals, or wind (for light seed), flooding, farm or seed cleaning machinery, spillage during transport, and a variety of human errors that may occur at each stage of the crop production process. Such pollen flow and seed movement presents a direct economic threat to farmers growing conventional crops or organic products. If organic crops or conventional crops are tainted with GE germplasm, farmers can lose their certification, their customers and markets, and their reputation.

Seed industry technology contracts state that seed movement is "well known and is a normal occurrence,"³³ and thus, they are not liable for potential crop contamination. Furthermore, because U.S. patent law does not require a showing of intent to support a finding of infringement, farmers can be sued if their fields are unknowingly contaminated. For example, seed giants have investigated and sued farmers whose fields were contaminated by pollen or seed potentially from a neighboring GE crop or when a previous year's GE crop sprouted, or "volunteered," in fields planted with conventional varieties the following year. Our investigation shows that the industry also sues farmers even when they were never presented with, and hence never signed, a technology use agreement at the time of seed purchase.³⁴

Promoting homogenous seed stocks via seed patenting and industrial agriculture has resulted in a dramatic loss of plant diversity.

The substantial risk of likely transgenic contamination and subsequent prosecution for patent infringement forced hundreds of family farmers and sustainable farm organizations, including Center for Food Safety, to file a lawsuit challenging Monsanto's patents and asking the court to disallow agrichemical companies from suing or demanding royalties from farmers when unintentional contamination occurs. This case, *Organic Seed Growers & Trade Ass'n v. Monsanto Co.*, is detailed in this report.

COMING TO A FARM NEAR YOU: EXTENDING CONTROL TO NON-GE SEEDS

For many years, the majority of lawsuits against farmers were related to GE seeds. However, agrichemical companies are now extending their technology agreements to cover non-GE seeds. For example, Seminis tomato seed packets notify the purchaser that upon opening the seed packet, they are engaging into a contract with the company and cannot save and replant seeds or use them for any kind of research.

HIGH PROFILE LAWSUITS

Agrichemical companies have pursued hundreds of legal challenges against U.S. farmers for purported seed patent infringement violations. As discussed in the report, several current cases are poised to alter the future legal landscape.

BOWMAN V. MONSANTO CO.

In February 2013, the U.S. Supreme Court will review a federal appeals court decision that Vernon Hugh Bowman, a 75-year-old farmer, infringed Monsanto's patents when he replanted soybean

seeds purchased from a grain elevator. Mr. Bowman's case centers on a doctrine known as "patent exhaustion," which holds that after an authorized sale of a patented item, a patentee's right to control the further use or resale of that item is "exhausted." This leaves the buyer free to use the patented item without restriction, limiting a patent holder's ability to hold a monopoly and receive royalty payments in perpetuity.

ASSOCIATION FOR MOLECULAR PATHOLOGY V. MYRIAD GENETICS, INC.

In 2013, the Supreme Court will also hear *Association for Molecular Pathology v. Myriad Genetics, Inc.*, a case about patents on human genes used for breast cancer research. The question presented by the Supreme Court as to why they granted certiorari (i.e., took the case) is quite broad: "Are human genes patentable?" The defendant company removed the genes and their DNA sequences from the body (or "isolated" them), and then patented them for lucrative testing purposes. While framed in the context of human genes, the Court's decision will likely impact the ability of corporations to patent genes more broadly, including germplasm.

ORGANIC SEED GROWERS & TRADE ASS'N V. MONSANTO CO.

Finally, *Organic Seed Growers & Trade Ass'n v. Monsanto Co.* is about patent infringement based on unintentional transgenic contamination. A decision from the U.S. Court of Appeals for the Federal Circuit in that case is expected in spring 2013.

CFS is a plaintiff in the third case and filed separate legal briefs in support of the petitioners in the above two cases.

BEYOND LEGAL LIMITS: BROADER IMPLICATIONS OF PRESENT SEED PATENT POLICIES

The harms of the current IP paradigm do not end with farmer prosecution and the loss of the right to save seed. *Seed Giants vs. U.S. Farmers* examines issues that are rarely discussed such as how seed patent policies reduce seed diversity, impair agricultural scientific research and innovation, and contribute to environmental harms, among other things.

SEED INDUSTRY CONCENTRATION

The advent of utility patent protection for plants is one of several factors³⁵ that triggered a massive wave of mergers and acquisitions in the 1980s that continues to the present day.³⁶

Large agrichemical firms such as Monsanto, DuPont, Syngenta, Dow, and Bayer have acquired scores of seed companies, including many of the largest firms with the highest-quality germplasm.³⁷ As of 2009, these five companies accounted for 58 percent of the world's commercial seed sales.³⁸

With this concentration has come increasing market power to raise seed prices and reduce availability of more affordable seed. Consolidation has also made it harder for smaller firms to survive and even more difficult for new seed firms to get a start because so much of the world's most desirable germplasm is patented by the seed giants. As corporations continue to accumulate patents for a vast amount of germplasm, their control over seeds writ large is expanding.

INCREASED SEED PRICES

Seed prices have risen dramatically in those crops in which patented GE varieties are now predominant, such as corn, soybeans, and cotton. USDA data show that since the introduction of GE seed, the average cost of soybean seed to plant one acre

has risen by a dramatic 325 percent, from \$13.32 to \$56.58. Similar trends exist for corn and cotton seeds: cotton seeds spiked 516 percent from 1995–2011 and corn seed costs rose 259 percent over the same period.

REDUCED SEED OPTIONS AND INNOVATION

Corporate strategies to promote transgenic crops further reduce innovation and variety of seeds. In the era of GE seed domination in commodity crops, it is becoming increasingly difficult for farmers to purchase conventional, non-GE seeds. This leaves many farmers with little choice but to jump on the transgenic bandwagon and purchase expensive GE seed, whether they want to or not.

USDA economists have found that seed industry consolidation has reduced research and likely resulted in fewer crop varieties on offer:

Those companies that survived seed industry consolidation appear to be sponsoring less research relative to the size of their individual markets than when more companies were involved. ... Also, fewer companies developing crops and marketing seeds may translate into fewer varieties offered.³⁹

Patents also strangle independent research. A letter to the Environmental Protection Agency (EPA) from prominent university scientists expressed their alarm at restrictions on scientific seed research due to both utility seed patents and industry technology agreements. As one scientist warned, “If a company can control the research that appears in the public domain, they can reduce the potential negatives that can come out of any research.”⁴⁰

ENVIRONMENTAL CONCERNS

It is beyond the scope of this report to detail the numerous environmental impacts that result from current patent and IP policies; however, the seed

Corporations did not create seeds, and many challenge the trending legal and policy system that allows private companies to assert ownership over a resource that is vital to survival.

monoculture paradigm has created significant harms, such as an overall loss of seed and plant diversity and a dramatic increase in chemical use, to name only a few.

LOSS OF SEED DIVERSITY When the seed industry pushed an amendment to the Plant Patent Act in 1968 to extend patents to include sexually reproduced plants, USDA opposed granting such patents, arguing that they would threaten development and introduction of new seed varieties. USDA’s concern was prescient of the grave loss of crop diversity that exists today. Promoting homogenous seed stocks via seed patenting and industrial agriculture has resulted in a dramatic loss of plant diversity. As seed consolidation has increased, seed variety has decreased.

Seed and plant varieties have diminished as small, local seed breeders have been replaced by large corporations that operate on a monoculture model. To illustrate, the U.S. has lost 6,000 of 7,000 apple varieties that used to be grown across the nation. Farmers in Washington now grow the same few apple varieties as farmers in California.⁴¹

SUPER WEEDS, SUPER PROBLEM Agronomists around the globe are alarmed by the growing epidemic of weeds that have evolved resistance to glyphosate, the primary herbicide sprayed on GE crops. *Farm Industry News*, January 2013, reported that the area of U.S. cropland infested with glyphosate-resistant weeds has expanded to 61.2 million acres in 2012. Nearly half of all U.S. farmers interviewed reported that glyphosate-resistant weeds were present on their farm in 2012, up from

34 percent of farmers in 2011. The publication reported that the spread of glyphosate-resistant weeds is gaining momentum, increasing 25 percent in 2011 and 51 percent in 2012.⁴²

Food availability and accessibility begin with equitable and fair access to land and vital natural resources, including seeds.

In response, farmers resort to more soil-eroding tillage operations to combat these weeds and also turn to increasingly toxic chemical cocktails. As a result, pesticide usage has significantly increased in the U.S. since the adoption of GE crops. Based on USDA data, upward of 26 percent more pesticides per acre were used on GE crops than on non-GE, conventional crops in 2008.⁴³

Agrichemical companies' response is to seek commercial approval of a more toxic brew of chemicals to douse on crops. Dow AgroSciences is seeking USDA approval of corn and soybeans resistant to 2,4-D, an active ingredient in Agent Orange, which is often contaminated with carcinogenic dioxins. Likewise, Monsanto is planning to seek approval for transgenic, dicamba-resistant soybeans, corn, and cotton. Dicamba has been linked to increased rates of colon⁴⁴ and lung cancer⁴⁵ in farmers.

THE WAY FORWARD: POLICY AND LEGAL REFORMS

As this report explains, there is an urgent need to reassess current policies. Instead of allowing a handful of corporations to control and own seeds, this report advocates several solutions. First, seeds should be understood to be part of the public domain and be protected in the public trust in order to ensure access to this vital resource. Seeds are products of nature. All proprietary activity should begin from this fundamental starting point.

Thus, one central reform at the national level is to amend the Patent Act to exclude such sexually reproducing plants (reproduced via seed) from being patented. Instead, plant protection measures are already available as codified in the Plant Variety Protection Act (PVPA). Under the PVPA, Certificates of Protection are awarded to new plant varieties. These Certificates strike a careful balance between conferring exclusive marketing rights to the breeder while also maintaining the rights of farmers to save seed and of researchers to continue to innovate and improve varieties. Finally, the report includes recommendations for state and local actions, such as passing state and local legislation for controlling or limiting the intrusive and aggressive alleged patent infringement investigations of farmers and farm businesses.

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FEEDING THE WORLD

Many assert that present-day seed patenting policies are needed in order to feed the planet. However, as Nobel laureate Amartya Sen has shown, hunger is fundamentally a problem of poverty, food distribution, and inequity. The United Nations General Comment on the Right to Food concurs: “The roots of the problem of hunger and malnutrition are not lack of food but lack of access to available food.”⁴⁶

Even though we currently grow enough food to feed the world, more than one billion people go hungry. Another two billion suffer health problems, including malnutrition, from being overfed with unhealthy food. For example, today, the number of children suffering from obesity almost outnumbers those children suffering from hunger.⁴⁷

Food availability and accessibility begin with equitable and fair access to land and vital natural resources, including seeds. Instead of devising an agricultural system that makes societies dependent on expensive seeds and chemicals, numerous studies demonstrate that agroecological farming methods—in which farmers save, breed, and plant seeds without the use of synthetic chemicals—provide stable and abundant food.

SEEDS AS THE COMMONS: THE MORAL IMPERATIVE

The moral imperative when determining appropriate seed policies is little discussed in today’s banter. But this is a much needed critical and civil discussion. Seeds are a product of nature. Corporations did not create seeds, and many challenge the trending legal and policy system that allows private companies to assert ownership over a resource that is vital to survival.

Throughout history and in most regions of the world today, seeds have been part of the “commons”—the common heritage of mankind that was part of the public domain for all to access. Farmers have been breeding, saving and re-planting, and freely exchanging seeds for millennia. As a result, a rich diversity of seed varieties and crops have been developed to adapt to global geographies, environmental conditions, weather patterns, local pests and plant diseases, and also to serve social and economic trends of regions and cultures. Such diversity is vital especially in times of climate chaos associated with global warming; societies require a full arsenal of diversity to adequately respond.

SEEDING CONTROL: CORPORATE TAKEOVER OF SEEDS



In the last few decades, the U.S. has led a radical shift to commercialization, consolidation, and control of seed ownership. Three agricultural firms—Monsanto, DuPont, and Syngenta—now control 53 percent of the global commercial seed market.¹ The top ten seed firms, with a majority stake owned by U.S. corporations, account for 73 percent.² This shift has fundamentally changed farming in the U.S. Instead of continuing the historical tradition of farmers having full access to seeds that they have cultivated over centuries, agricultural corporations now own the *sine qua non* of farming—indeed, the irreplaceable element of all food—seeds.

BRIEF HISTORY OF SEED IN THE U.S.

Humans have improved plants since the dawn of agriculture. The crops grown today are the culmi-

nation of this long tradition of plant breeding. Farmers, public sector breeders, and private seed firms have all made important contributions.

FARMER-BREEDERS Since the founding of the United States, farmers—including Native American agriculturalists—have played a critical role in developing crop varieties that form the basis of modern agriculture. Their efforts produced a rich diversity of crop varieties adapted to different regions, soil types, climates, local pests and plant diseases, and cultures.

Farmers have contributed to this steady genetic improvement of crops through the simple but effective process of mass or phenotypic selection, in which seeds from the healthiest and most productive plants are saved and replanted the following season, a practice continued by some farmers today.³

America's early leaders understood that strengthening agriculture was absolutely essential to the nation's economic development. Farmers played a crucial role in this process, aided by the U.S. Patent Office.⁴ Commissioner of Patents Henry Ellsworth regarded the provision of novel plant varieties to be as much the business of the Patent Office as encouraging mechanical inventions.

Beginning in 1839, Ellsworth obtained congressional funding to coordinate the collection of new crop varieties from around the world and the distribution of seeds to American farmers. Farmers tested these new seeds, conducted extensive breeding with them, and thereby laid the genetic foundations for American agriculture. Among the more famous farmer-bred varieties are Red Fyfe wheat, Grimm alfalfa, and Rough Purple Chili potato. The U.S. Department of Agriculture (USDA), founded in 1862, continued this program of germplasm distribution and farmer-led breeding into the early 20th century. By the turn of the 19th century USDA had distributed over one billion packages of seeds to farmers across the country.⁵

PUBLIC SECTOR The USDA, land-grant universities, state experiment stations and other publicly funded institutions conducted more systematic testing and breeding of new crop varieties in the 20th century. Publicly funded scientists revolutionized breeding with backcrossing, a process whereby a valuable trait (e.g., disease resistance) of a plant variety not suitable for food production is introduced into a commonly used variety to improve it. Public sector scientists also developed the process of hybridization, including the first high yielding hybrid corn varieties.⁶

Most major new crop varieties developed throughout the 20th century owe their origin to publicly funded agricultural research and breeding. In 1980, the share of overall U.S. crop acreage planted with

public sector seed was 70 percent for soybeans, and 72-85 percent for various types of wheat.⁷ The substantial yield increases in corn, cotton, and soybeans since 1930 evince the "unambiguous hegemony of public science in the field of plant breeding"⁸ in the 20th century.

Instead of continuing the historical tradition of farmers having full access to seeds that they have cultivated over centuries, agrichemical corporations now own the *sine qua non* of farming—indeed, the irreplaceable element of all food—seeds.

PRIVATE SECTOR Until recently, the private sector's chief role in the seed industry was to multiply and sell regionally adapted varieties developed in the public domain. This was done primarily by numerous, often family-owned seed firms scattered across the country.⁹ Only in those few field crops that had been successfully hybridized (corn, sorghum, and sunflower) did the private sector play a more active breeding role.¹⁰

One major attraction of hybrid seed to private firms was that it does not breed true and thus must be purchased anew each year, offering more profit potential than true-breeding crops such as wheat and soybeans. Pioneer and other corn seed firms adopted hybridization techniques developed by public sector breeders and became dominant in hybrid corn beginning in the 1930s.¹¹

BRAVE NEW WORLD: ENTERING A NEW INTELLECTUAL PROPERTY PARADIGM

The vast majority of plant improvement in American history has been accomplished by farmers and public sector plant breeders, and these tremendous advances were made without any system of "innovation-promoting" intellectual property protection for plants. For the first two centuries of this country's

history, Congress consistently refused to authorize patents on staple food crops. However, under increasing pressure and marketing from agrichemical companies, seed patents and the IP regime have enshrined corporate interests instead of safeguarding farmers and small, independent businesses.

The vast majority of plant improvement in American history has been accomplished by farmers and public sector plant breeders, and these tremendous advances were made without any system of “innovation-promoting” intellectual property protection for plants.

THE PLANT PATENT ACT The federal Patent Act of 1790 allowed utility patents for “any useful art, manufacture, engine, machine, or device, or any improvement thereon not before known or used.”¹² However, utility patents were not allowed for seeds and plants. Seed firms began pressing for a plant patent system and Congress responded with the Plant Patent Act of 1930 (PPA), which established a patent system for asexually propagated plants (e.g., ornamentals, fruit and nut trees, and other plants reproduced via budding, cutting, and grafting).¹⁴

However, the real significance of Congress’s passage of the PPA was what it excluded. The great majority of food-producing plants—e.g., wheat, corn, rice, oats, soybeans, most vegetables and many others—are reproduced sexually (via seeds). Congress, backed by farmers and USDA, refused to permit patents on these staple food crops. This reflected the common-sense conviction that private sector entities should not be entrusted with monopoly control over the very source of our food supply. Even potatoes, which are asexually reproduced, were denied patent protection, underscoring Congress’s intent that important food crops should remain unpatentable.¹⁵

THE PLANT VARIETY PROTECTION ACT (PVPA) In 1970, Congress passed the Plant Variety Protection Act (PVPA). This Act empowered USDA to grant Certificates of Protection for novel sexually reproducing plant varieties grown from seed.¹⁶ The Certificates conferred exclusive marketing rights to the breeder for an 18-year term (subsequently amended to 20 years). However, the Certificates established two critical exemptions: 1) farmers must be allowed to save seeds for replanting; and 2) patented varieties must be made available to researchers.¹⁷ With these exemptions, Congress explicitly recognized that farmers and public-interest breeders were vital partners in the continuing improvement of plant varieties and enshrined in law the millennia-old right of farmers to save seeds.

The PVPA balanced the interests of seed firms, farmers, and public sector plant breeders. On the one hand, it granted strong protections to the seed industry by making it illegal for one firm to illicitly multiply and sell a seed variety developed by a corporate competitor. At the same time, Congress provided exemptions to farmers and breeders. As noted above, farmers could save and replant PVPA-protected seed, while plant breeders could utilize protected varieties in further breeding work to develop still better plants.¹⁸ (A 1994 amendment to the law prohibited farmers from selling PVPA-protected seed to other farmers, which the original PVPA had allowed.)¹⁹

Despite the strong protections available under the PVPA, the seed industry moved aggressively to obtain still greater control over seed. The entry of powerful agrichemical firms such as Monsanto and DuPont into the seed business provided considerable clout and financial resources toward this goal. These firms worked diligently to achieve what their predecessors had failed to accomplish—total control over plants as “inventions,” which meant

obtaining utility patent protection. Utility patents had long been granted to inventors of mechanical devices, but Congress viewed such patents to be inappropriate when applied to plants. (Utility patents are further discussed in the next section.)

UNPRECEDENTED LEGAL DECISIONS IMPACTING PLANT PATENTS

The critical paradigm shift came in *Diamond v. Chakrabarty*, the 1980 landmark 5-4 Supreme Court decision that held for the first time that living organisms—in this case, a genetically engineered bacterium—could be granted utility patents under the 1790 Patent Act.²⁰ According to the Court's majority, because the patentee had introduced new genetic material within the bacterium cell, he had produced something that was not a product of nature and was thus patentable subject matter. The *Chakrabarty* decision that living organisms should be patented is far from universally accepted.²¹

Nonetheless, the decision paved the way for the U.S. Patent and Trademark Office (USPTO) to decide in the 1985 case *Ex parte Hibberd* that sexually reproducing plants are patentable under the Patent Act. This allowed corporations to obtain utility patents, effectively a policy tool allowing control over plants as “inventions.” Utility patents (unlike PVPA certificates) allow the corporate patent holders to deny farmers the right to save and replant seed and exclude others from using any patented variety for research.²² Such patents also formed the basis upon which the seed giants crafted technology agreements, contracts that farmers must now sign upon purchase of most patent-protected seeds, which restrict a farmer's access to seed, among other constraints. (See Chapter Two.)

Affirming the USPTO's practice, in 2001, another 5-4 Supreme Court decision in *J.E.M. Ag Supply v. Pioneer Hi-Bred International* upheld the granting of

utility patents for plants.²³ Of note, this case did not involve a genetically engineered plant; instead, the utility patent that was upheld was a patent for a hybrid plant.

What was once a freely exchanged, renewable resource [seeds] is now privatized and monopolized.

Henceforth, plants and plant parts became eligible for utility patents, setting the stage for prohibition of farmer seed saving and breeding as forms of patent infringement. Today, utility patents have largely superseded PVPA Certificates of Protection as the preferred vehicle for intellectual property rights to new plant varieties, particularly those developed with use of genetic engineering.

These judicial decisions greatly expanded the scope of intellectual property rights for plants. Corporations stampeded the USPTO with over 1,800 patent submissions for the genetic material of seeds and plants.²⁴ While firms raced to patent genetic resources and plant breeding techniques, they also rapidly acquired existing seed companies: the agricultural biotechnology industry emerged through the rapid acquisition of existing seed firms by chemical and pesticide companies such as Monsanto, DuPont, Syngenta, and Dow.²⁵ The agrichemical giants spent billions of dollars to acquire seed firms; at least 200 independent seed companies were purchased and consolidated from 1996–2009.²⁶

As a consequence, what was once a freely exchanged, renewable resource is now privatized and monopolized. Current judicial interpretations have allowed utility patents on products of nature, plants, and seeds, without exceptions for research and seed saving. This revolutionary change is contrary to centuries of traditional seed breeding based on collective community knowledge, and reverses the established notion that seeds should remain in the public domain and for the public good.

THE ROLE OF GENETICALLY ENGINEERED (GE) SEEDS

The introduction of GE, or transgenic, crops has fundamentally altered farming for thousands of American farmers. Genetically engineered seed patents are now a central mechanism by which to gain control and ownership of genetic material of seeds writ large. Biotechnology firms can claim comprehensive rights to GE plants by virtue of inserting a single gene. The advent of genetic engineering has expedited claims for seed patents and subsequently has become a gateway to controlling seed germplasm writ large.

Such market concentration has led to increased seed prices, reduced seed options and innovation, restrictions on scientific research, and has environmental impacts such as loss of diversity and increased chemical use in farming.

The vast majority of the four major commodity crops in the U.S. are now genetically engineered. U.S. adoption of transgenic crops has been rapid, but limited to commodity crops, in which GE varieties now make up the substantial majority: soybean (93 percent transgenic in 2010), cotton (88 percent) corn (86 percent), and canola (64 percent).²⁷ This shift toward market domination of GE seeds is a primary basis for the plethora of investigations and lawsuits targeting farmers. (See following chapter for more on litigation aspects.)

A NOVEL INVENTION? In genetic engineering, a gene and other DNA from virtually any organism—most often from a soil bacterium and virus—are spliced into a plant to transfer a new trait, such as resistance to an herbicide. Seed firms patent the added gene, and the method for inserting it into the plant. In what many view to be unjustified, patent officials and courts also grant them patent rights to the entire plant.

Critics of the current patent regime point out that a gene added by genetic engineering is just one among thousands of native plant genes (a soybean plant has over 46,000 genes).²⁸ And the single property conferred by that gene is just one among all of the many properties that make the plant what it is. For example, non-GE properties include yield potential, seed size, time to maturity, various seed qualities (e.g., nutritional enhancements), disease resistance, drought tolerance, and adaptations to particular soils and climates, among many others. Such properties are the product of millennia of plant breeding and have nothing to do with genetic engineering.

BEYOND LEGAL LIMITS: BROADER IMPLICATIONS OF THE PRESENT SEED PATENT REGIME

The advent of patent protection for plants has triggered profound changes in American agriculture, including socio-economic and environmental con-

CROP SEED COST (\$/planted acre)	1975	1995	2011	1975-1995 (% increase)	1995-2011 (% increase)
SOYBEANS	\$8.32	\$13.32	\$56.58	60%	325%
CORN	\$9.30	\$23.98	\$86.16	158%	259%
COTTON	\$5.88	\$15.67	\$96.48	166%	516%

Figures from USDA Economic Research Service: Commodity Costs and Returns: U.S. and Regional Cost and Return Data. Datasets accessible at: <http://www.ers.usda.gov/Data/CostsAndReturns/testpick.htm>.

sequences, as well as prosecution of farmers (as will be discussed in the following chapters).

Plant patents, offering lucrative financial opportunities, helped stimulate a wave of mergers and acquisitions that have allowed much of the world's valuable crop germplasm to be controlled by a handful of multinational agrichemical giants. Such market concentration has led to increased seed prices, reduced seed options and innovation, restrictions on scientific research, and has environmental impacts such as loss of diversity and increased chemical use in farming.

SEED INDUSTRY CONCENTRATION The introduction of utility patent protection for plants is one of several factors²⁹ that triggered a massive wave of mergers and acquisitions in the 1980s that continues to the present day.³⁰ Large agrichemical firms such as Monsanto, DuPont, Syngenta, Dow, and Bayer acquired scores of seed companies, including many of the largest firms with the highest-quality germplasm (e.g., DeKalb, Holden's Foundation Seeds, Pioneer).³¹ As of 2009, these five companies accounted for 58 percent of the world's commercial seed sales.³²

Monsanto, the world's largest seed firm, accounted for 27 percent of global commercial seed sales in 2009.³³ The company spent \$4.81 billion within a five-year span (2005–2009) to acquire numerous seed firms, an average of \$963 million annually. This expenditure represents far more than their entire research and development budget for both seeds and chemicals over the same period.³⁴ Monsanto's acquisitions include at least 22 midwestern seed firms under its American Seeds subsidiary, and major vegetable seed producers such as Seminis and De Ruiter Seeds. Monsanto not only sells over one-quarter of the world's commodity seeds, it has a near monopoly in GE "traits," which are found in roughly 86 percent of the GE seeds sold in the U.S.³⁵

The company also generates billions in sales through technology licensing agreements with other seed companies. Such is Monsanto's dominance that in 2009, the U.S. Department of Justice began an investigation into anticompetitive practices that had resulted in sharply rising GE seed prices and a dwindling supply of non-GE seed due to Monsanto's seed pricing systems and market control.³⁶

Plant varieties have diminished as small, local seed breeders have been replaced by large corporations that operate on a monoculture model.

Such consolidation has made it harder for smaller firms to survive, and even more difficult for new seed firms to get a start because so much of the world's most desirable germplasm has been locked up by the seed giants. In 2009, the Independent Professional Seed Association estimated that the number of independent seed companies had declined to just 100, from 300 independent and consolidated firms in 1996.³⁷

INCREASED SEED PRICES Seed prices have risen dramatically in corn, soybeans, and cotton, crops predominated by patented GE varieties. USDA data show that since the introduction of GE seed, the average cost of soybean seed to plant one acre has risen by a dramatic 325 percent, from \$13.32 to \$56.58. Similar trends are evident for corn and cotton seeds: cotton seed prices spiked 516 percent from 1995–2011 and corn seed costs rose 259 percent over the same period (see table below).

These price hikes are chiefly attributable to a "technology fee" premium that the companies charge for each GE "trait" introduced into a seed line. Monsanto's Roundup Ready trait fee has risen sharply, from just \$4.50 per bag of GE soybean seed in 1996 to an estimated \$17.50 by 2008.³⁸

Agricultural economist Dr. Charles Benbrook has found that rapidly increasing GE seed prices claim an ever greater share not only of farmers' operating costs, but also of their gross crop income and net return per acre.³⁹ The latter measures suggest that the dramatically increased cost of GE seeds is offsetting any economic benefits they provide. According to Dr. Benbrook: "If these GE seed price and income trends continue, the consequences for farmers will be of historic significance, as dollars once earned and retained by farmers are transferred to the seed industry."⁴⁰

USDA economists have found that seed industry consolidation has reduced seed innovation and likely resulted in fewer crop varieties on offer.

Farmers and agronomists are greatly concerned by these seed price increases, especially in the context of rapidly rising costs for fertilizers and other inputs.⁴¹

REDUCED SEED OPTIONS & INNOVATION

USDA economists have found that seed industry consolidation has reduced seed innovation and likely resulted in fewer crop varieties on offer:

Those companies that survived seed industry consolidation appear to be sponsoring less research relative to the size of their individual markets than when more companies were involved. . . . Also, fewer companies developing crops and marketing seeds may translate into fewer varieties offered.⁴²

In the era of GE seed domination in commodity crops, it is becoming increasingly difficult for farmers to purchase non-GE seeds. This leaves many farmers with little choice but to jump on the transgenic bandwagon and purchase expensive GE seed, whether they want them or not.

One sign of this failing innovation is that few types of GE crops are available. Virtually 100 percent of

transgenic acreage in the U.S. is planted to crops with just one or two traits. These are: 1) herbicide-resistant crops that enable application of one or more herbicides to kill weeds without harming the crop; and/or 2) insect-resistant, Bt crops that produce toxins in their tissues that kill certain pests that try to feed on them.

Moreover, the great majority of herbicide-resistant (HR) crops are Monsanto's Roundup Ready varieties, resistant to Roundup herbicide, which contains the active ingredient glyphosate. HR seeds and their associated herbicides are sold together as a profitable, packaged system, with herbicide revenues used to fund further HR crop development. In the year 2000, roughly half of Monsanto's revenue came from sales of Roundup.⁴³ This revenue, from increased use of Roundup with Roundup Ready crops, helped fund further HR crop development efforts. As noted elsewhere in this report, glyphosate is the most heavily used herbicide in the world.⁴⁴

Seed choices for farmers are further reduced by the seed giants' "biotech trait penetration" strategies. Seed firms pack their seed catalogs with the latest and most expensive GE seed varieties that often contain multiple traits and retire conventional lines and those with fewer traits. A prime example is Monsanto's "triple-stack" corn, which combines the Roundup Ready (RR) trait and two insect-resistance traits. Many corn farmers who have no need or desire for the Roundup Ready trait nonetheless purchase "triple-stack" corn because they cannot find good varieties without it.⁴⁵ Monsanto is already in the process of transitioning farmers from triple-stack to its eight-trait "Smart-Stax" corn, the most expensive corn seed on the market.⁴⁶

The following excerpt from a 2008 Goldman-Sachs report gives a glimpse into how Monsanto

views its farmer-customers as “captives” of its profit-driven marketing strategies:

...Monsanto would like to move as many customers to triple stacks as possible. This can help make inventory and production management much more manageable and *create a captive customer base* [emphasis added] for the 2010 launch of its SmartStax octo-stack product.⁴⁷

This understandably worries some of Monsanto’s “captive” farmers who cannot afford, do not need, or do not want the additional traits. Farmer Harris Armour from Somerville, Tennessee has nothing against GE seed, but he has some reservations about SmartStax. “I like to buy what I want,” he said. “When they start stacking for things I don’t need, it just makes the price of the seed go up.”⁴⁸

RESTRICTING INDEPENDENT SCIENTIFIC RESEARCH In 2009, 26 prominent university scientists sent a letter to the Environmental Protection Agency (EPA) to express their alarm at restrictions on independent scientific research due to both utility seed patents and industry technology agreements.

Technology/stewardship agreements required for the purchase of genetically modified seed explicitly prohibit research. These agreements inhibit public scientists from pursuing their mandated role on behalf of the public good unless the research is approved by industry. As a result of restricted access, no truly independent research can be legally conducted on many critical questions regarding the technology....⁴⁹

As one scientist warned, “If a company can control the research that appears in the public domain, they can reduce the potential negatives that can come out of any research.”⁵⁰

Dow AgroSciences is seeking USDA approval of corn and soybeans resistant to 2,4-D, an active ingredient in Agent Orange, which is often contaminated with carcinogenic dioxins.

According to several accounts in respected science journals, companies suppress research in numerous ways. Scientists who are deemed too critical may be denied permission to conduct research at all.⁵¹ In many cases, stringent and often unacceptable conditions are set. For instance, Monsanto demanded the right to approve publication of scientific research on its Roundup Ready sugar beets by university researchers as a condition for allowing the research to proceed; the universities could not accept such strictures and the research was abandoned.⁵² Pioneer prohibited researchers from publishing data on the near 100 percent mortality of lady beetles that had fed on an experimental variety of their GE corn.⁵³ According to University of Arizona entomologist Bruce Tabashnik, a Dow AgroSciences employee told him he would be subject to legal action by Dow if Tabashnik cited adverse data he had obtained from EPA concerning one of the company’s GE corn varieties.⁵⁴ Syngenta prohibits scientists from doing studies that compare its crops to those of its competitors.⁵⁵

University agricultural scientists have long provided farmers and the public with reliable independent data on the properties and performance of crops. Independent science also provides vital input for U.S. regulators, who otherwise depend almost exclusively on company-provided data in making regulatory decisions on GE crops. According to the scientists writing the EPA, the current patent-based restrictions “unduly limit[]” the provision of independent scientific data to regulators.⁵⁶ Another scientist notes that companies could “launder the data” they provide to regulators, and without the check of independent science, such laundered data would go completely unquestioned.⁵⁷

In 2009, 26 prominent university scientists sent a letter to the Environmental Protection Agency (EPA) to express their alarm at restrictions on independent scientific research due to both utility seed patents and industry technology agreements.

LOSS OF PLANT DIVERSITY Just as biodiversity is essential to the health of ecosystems and human wellbeing, so our food and agricultural system cannot thrive without a diverse array of seed varieties. Buttressed by utility patents, the seed monoculture paradigm has caused significant harms, including an overall loss of plant biodiversity.

When the seed industry pushed an amendment to the Plant Patent Act in 1968 to extend patents to include sexually reproduced plants, USDA opposed granting such patents, arguing that they would threaten development and introduction of new seed varieties. USDA's concern was prescient of the grave loss of crop diversity that has since occurred. Promoting homogenous seed stocks via seed patenting and industrial agriculture has resulted in a dramatic loss of crop biodiversity.

Plant varieties have diminished as small, local seed breeders have been replaced by large corporations that operate on a monoculture model. For centuries farmers and plant breeders fostered a diverse array of germplasm by selecting for locally adapted varieties to thrive in diverse soils, geographies, and climates. To illustrate, the U.S. has lost 6,000 of 7,000 apple varieties that were formerly grown in local regions throughout the nation. Today, only two cultivars account for more than 50 percent of apple production.⁵⁸

Further, most agricultural cultivars are derived from native, locally-adapted plants and depend on them as a source of new genes. In particular danger of extinction in the wild are soybeans, tomatoes,

wheat, coffee, and grapes.⁵⁹ The loss of these hearty, native varieties can spell extinction for common crops in the decades to come.

SUPER WEEDS, SUPER PROBLEM Agronomists around the globe are alarmed by the growing epidemic of weeds that have evolved resistance to glyphosate, the primary herbicide sprayed on GE crops. Widespread planting of Monsanto's Roundup Ready crops has made glyphosate (the active ingredient of Roundup) the most heavily used pesticide in the world.⁶⁰ This massive chemical assault has triggered an epidemic of glyphosate-resistant weeds. It was recently reported that the area of U.S. cropland infested with glyphosate-resistant weeds has expanded to 61.2 million acres in 2012, according to a survey conducted by Stratus Agri-Marketing. Nearly half of all U.S. farmers interviewed reported that glyphosate-resistant weeds were present on their farm in 2012, up from 34 percent of farmers in 2011. The survey also indicates that the rate at which glyphosate-resistant weeds are spreading is gaining momentum, increasing 25 percent in 2011 and 51 percent in 2012.⁶¹

In response, farmers resort to more soil-eroding tillage operations to combat these weeds and also turn to increasingly toxic chemical cocktails. As a result, pesticide usage has significantly increased in the U.S. since the adoption of GE crops. Based on USDA data, upward of 26 percent more pesticides per acre were used on GE crops than on non-GE, conventional crops in 2008.⁶²

Leading weed scientists warn that farmers are "running out of options" to control what is rapidly becoming an "unmanageable problem."⁶³ Because of the extraordinary dependence on Roundup Ready crops, weeds resistance to glyphosate and multiple herbicides pose a threat to global food production.⁶⁴

Agrichemical companies' response is to seek commercial approval of a next generation of GE crops that are resistant to a more toxic brew of chemicals. Dow AgroSciences is seeking USDA approval of corn and soybeans resistant to 2,4-D, an active ingredient in Agent Orange, which is often contaminated with carcinogenic dioxins. Likewise, Monsanto is planning to seek approval for transgenic, dicamba-resistant soybeans, corn, and cotton. Dicamba has been linked to increased rates of colon and lung cancer in farmers.⁶⁵

Today's seed patent system transfers control of vital resources—seeds and plants—from communities and the public domain to private corporations. Such control and privatization greatly impacts broader socio-economic issues as highlighted in this chapter. The following chapter will discuss how legally binding technology contracts, which farmers must now sign upon purchasing seeds, have become a central instrument for harassing and often prosecuting farmers.



TECHNOLOGY USE AGREEMENTS: FARMERS AS SERFS



Historically, farmers have ensured a diverse genetic pool from which other farmers and plant breeders can select, using experimentation and natural selection of new plants and varieties. Unfortunately, the advent of patented seeds has dramatically altered this historic role. To exert greater control over their patented material, seed companies rely on farmer contracts known as Technology Use Agreements. These agreements include a variety of provisions that require company access to farmer records, dictate farming practices, and open the door for on-site investigations.

The agreements contain broad provisions giving seed companies access to any documents they deem to be necessary when investigating farmers.

Monsanto, the industry leader in procuring seed patents, was the first company to require farmers to sign technology and stewardship agreements. Farmers sign a short Technology Use/Stewardship Agreement (agreement or contract) that incorporates by reference the company's Technology Use Guide (use restrictions), an extensive document that Monsanto revises annually, thereby affecting the duties of a farmer under the original agreement.¹ Other agrichemical companies follow this model.²

These contracts subject farmers to significant invasions of their private property and personal records. For example, certain provisions transfer liabilities associated with a company's patented technology, including market burdens and transgenic contamination events, directly to the farmer.

Additionally, the complex seed genetic licensing schemes between agrichemical companies unify industry interests against small farmers. By developing inter-company agreements, they can bring lawsuits against farmers on one another's behalf. For example, Monsanto explicitly acts on behalf of Dow Agrosciences, licensing some of Dow's genetically engineered traits in the Monsanto Technology Use Agreement.³ Syngenta's Stewardship Agreement explains that it can act on behalf of Monsanto and Dow to protect all three companies' patents.⁴

EXPANSIVE SCOPE OF TECHNOLOGY AGREEMENTS

The scope of the technology agreements allows for intrusive invasion of farmer privacy. For example, Dow's technology agreement requires farmers to complete questionnaires for, and provide planting information to, company investigators.⁵ Farmers must also agree to give Monsanto their internet service provider records, purportedly to "validate Grower's electronic signature." Monsanto, Dow, and Syngenta agreements allow the companies to access records concerning farmers' activities held by third parties, such as the U.S. government.⁶ In particular, the agreements allow investigators to review USDA Farm Service Agency (FSA) crop reporting information, including aerial photos and farmer submissions, on any land farmed by the grower.⁷

Providing access to the FSA form helps companies to determine how many bags of seed a farmer was sold and how many acres of a particular crop were planted, facts the companies use to draft complaints against farmers they suspect of saving seed. This data can also be used to identify adjacent fields owned by neighboring growers—who may themselves be potential targets of investigations—without their consent.

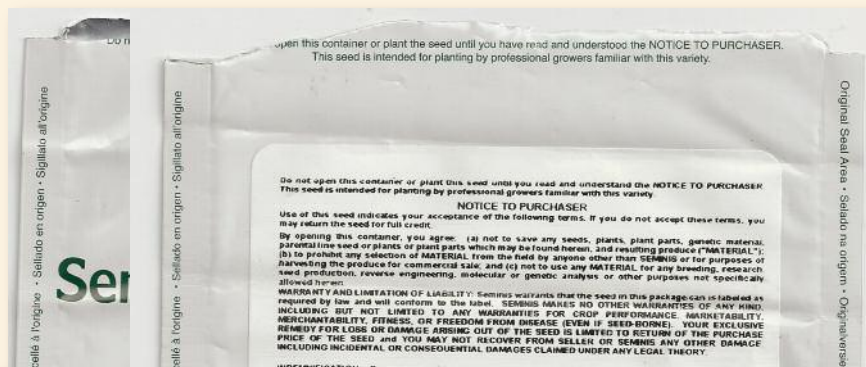
Historically, farmers have ensured a diverse genetic pool from which other farmers and plant breeders can select, using experimentation and natural selection of new plants and varieties.

Additionally, the agreements contain broad provisions giving seed companies access to any documents they deem to be necessary when investigating farmers. As one example, the Monsanto agreement obligates farmers: "To provide Monsanto copies of *any* [emphasis added] records, receipts, or other documents that *could be relevant* [emphasis added] to Grower's performance of this Agreement."⁸ This includes receipts for any chemicals or herbicides purchased, acreage reports, and aerial photographs.⁹ Growers have to produce these records seven days after written request.¹⁰ The breadth of this provision allows the company to obtain documents that are not necessarily directly related to a farmer's seed and permits investigators to assess a farmer's financial state prior to filing suit.

Other invasive aspects of the agreements include requiring farmers to identify and provide investigators access to all the farmer's land and facilities.¹¹ The agreements also contain provisions that allow for property investigations, such as access to any seed storage containment under the control of the grower.¹² For example, Monsanto has the following blanket provision covering all patented seeds:

If Monsanto *reasonably believes* [emphasis added] that a grower has planted saved cottonseed containing a Monsanto biotech trait, Monsanto will request invoices and records to confirm that fields in question have been planted with newly purchased seed. This information is to be provided within 7 days after written request. Monsanto may inspect and test all of the grower's fields to determine if saved seed has been planted.¹³

COMING TO A FARM NEAR YOU: TECHNOLOGY AGREEMENTS FOR NON-GE SEEDS



NOTICE TO PURCHASER
Use of this seed indicates your acceptance of the following terms. If you do not accept these terms, you may return the seed for full credit.
By opening this container, you agree: (a) not to save any seeds, plants, plant parts, genetic material, parental line seed or plants or plant parts which may be found herein, and resulting produce ("MATERIAL"); (b) to prohibit any selection of MATERIAL from the field by anyone other than SEMINIS or for purposes of harvesting the produce for commercial sale; and (c) not to use any MATERIAL for any breeding, research, seed production, reverse engineering, molecular or genetic analysis or other purposes not specifically allowed herein.



For many years, the majority of lawsuits against farmers were related to GE seeds. However, agrichemical companies are now extending their technology agreements to cover non-GE seeds. For example, Seminis tomato seed packets notify the purchaser that upon opening the seed packet, they are engaging into a contract with the company and cannot save and replant seeds or use them for any kind of research.

PHOTO PROVIDED BY ORGANIC SEED ALLIANCE

COMPREHENSIVE BANS ON SEED SAVING

Seed company technology agreements and attendant contracts stipulate that farmers cannot save seed for another generation of planting. The provisions are comprehensive and extremely inclusive as they attempt to cover any format of seed saving that might arise.

For example, Monsanto agreements prohibit seed saving by asserting that farmers may not save or clean seeds for planting, supply Monsanto seeds from/to anyone for planting, and/or transfer seeds to anyone for planting, unless the grower is also under contract with Monsanto for seed production.¹⁴ Rather, farmers are permitted to use seed only for a “single commercial crop.”¹⁵ Farmers are also prohibited from planting seed or transferring seed to others for “breeding, research, or generation of herbicide registration data.”¹⁶ Further, the agreements prohibit research on growers’ crops “other than to make agronomic comparisons and conduct yield testing for Grower’s own use.”¹⁷

Other agrichemical companies have followed suit in restricting replanting and research. Pioneer’s Terms and Conditions of Purchase for all of its patented seeds specifies that buyers can only purchase seed for a single crop and explicitly forbids seed saving.¹⁸ It forbids any breeding or research of its seed.¹⁹ Similarly, Dow’s technology agreement stipulates the contract to be “a limited, non-transferable, revocable, non-exclusive license by [Dow] under the Licensed Rights to purchase Seed from Seed Seller and to plant Purchased Seed to produce a single commercial crop in the United States.”²⁰ Dow’s agreement also forbids seed saving, transferring seeds to others, researching, propagating, and breeding.²¹ Syngenta’s agreement contains similar covenants.²²

ACKNOWLEDGMENT OF FORESEEABLE TRANSGENIC CONTAMINATION

The tech-

Seed company technology agreements and attendant contracts stipulate that farmers cannot save seed for another generation of planting.

nology agreements also recognize that GE crops are, by nature, transportable from one farm onto another farm by pollen flow or through seed movement via animals or equipment: “It is generally recognized in the industry that a certain amount of incidental, trace level pollen movement occurs, and it is not possible to achieve 100 percent purity of seed or grain in any crop production system.”²³ Such transgenic pollen flow and seed movement presents a direct economic and irreparable threat to farmers growing conventional or organic crops in the forms of lost markets, reputation, crop certification, and ability to sow the crop of their choice. Such contamination also opens the contaminated farmer to potential allegations of patent infringement, since infringement is a strict liability offense, which does not require a showing of intent.²⁴

THIS LAND IS NOT YOUR LAND Agrichemical company contracts are created so that customers remain bound by the terms from season to season and can only leave the contractual relationship by formally notifying the company. In many situations, if one farmer sells land cultivated with patented crops to another person, the new owner must also adopt the technology agreement.²⁵ This process is as follows: An updated agreement is mailed to farmers each year, and farmers are automatically bound by any new terms if they continue to use Monsanto’s seed.²⁶ Additionally, farmers who discontinue their use of patented seed face patent infringement allegations in the event that some of that seed from the previous year sprouts “volunteers” in fields converted to another variety. If there is a contract breach, Monsanto can blacklist the farmer from being granted any future contract unless the company provides the farmer express

permission in which the grower must acknowledge the prior breach.²⁷

In many situations, if one farmer sells land cultivated with patented crops to another person, the new owner must also adopt the technology agreement.

EXTREME DAMAGES, BANKRUPTCY, AND CONTROLLED JUDICIAL REVIEW Technology agreements expose farmers to extreme financial hardship, including bankruptcy.²⁸ Contracts specify that the company can recover costs and fees when suing over intellectual property rights.²⁹ Patent law also permits prosecution and damage awards for up to *three times* the actual amount of loss.³⁰ This liability can also lead to the grower paying the seed company and its licensed technology providers for their attorneys' fees and costs of enforcing the agreement. Bankruptcy is not an uncommon outcome.³¹

Adding to these costs, Monsanto's contracts places farmers at an additional disadvantage by requiring that the exclusive jurisdiction and venue for all disputes go to the U.S. District Court for the Eastern District of Missouri or the Circuit Court of the County of St. Louis³²—both in Monsanto's hometown. Similarly, Pioneer's Terms and Conditions requires that all claims be governed by the laws of the state of Iowa and that all cases be litigated in Wilmington, Delaware.³³ At least one federal judge has held a Missouri forum clause in a prior Monsanto technology use agreement an unenforceable "contract of adhesion" due to the difference in bargaining power between Monsanto and individual growers, the fact that the contract terms are not open to negotiation, and the lack of market alternatives to Monsanto's transgenic soybeans.³⁴

Monsanto also applies special conditions to cotton farmers, requiring any claims from them against Monsanto be undertaken pursuant to confidential arbitration.³⁵ Its contract has a further damages provision that cotton farmers must pay in excess of other farmers' duties under the contract.³⁶

These contractual requirements present legal, financial, and logistical hurdles for farmers that can lead to financial ruin. As a result, farmers are often forced to agree to confidential, out-of-court settlements in order to move on with their lives and end investigations and litigation. According to Monsanto's records as of 2006, farmers paid the company an estimated \$85 to \$160 million in out-of-court settlements.³⁷

STATE FARMER PROTECTION ACTS In light of these contract requirements, it is unsurprising that in recent years several states have enacted "farmer protection" laws to provide their farmers with some procedural protections from patent holders' pernicious practices and require that any seed contract that is in conflict with these laws is unenforceable. Some of their protections include: in instances of alleged infringement, requiring written notice to and/or permission of the farmer before any crop sampling is undertaken by the patent holder and requiring that the farmer and a state representative be present for the sampling; that independent or matching samples be taken; that venue is proper in the home state, as opposed to the patent holder's forum of choice; and that unintended contamination cannot be grounds for infringement.³⁸ Unfortunately, only a few states have passed such laws, and many more are needed. These laws and their importance are discussed further in Chapter Four.

DRAGNET: PURSUING AND PROSECUTING AMERICAN FARMERS



Agrichemical companies devote significant resources to prosecution of farmers for alleged seed patent infringement. For example, in 2003 Monsanto's investigation department housed 75 employees with a budget of \$10 million for the purpose of investigating and prosecuting farmers for patent infringement.¹ In recent years, other companies such as DuPont have hired private investigation firms such as Agro-Protection International to pursue farmers.² In 2012, DuPont, the world's second largest seed company, hired dozens of investigators to examine planting and purchasing records of Canadian farmers, as well as take samples from their fields for genetic analysis. DuPont is expanding this operation to the U.S. in 2013, hiring approximately 35 investigators, many former police officers.³

Efforts to prosecute farmers can be divided into three stages: investigations of farmers; out-of-court settlements; and litigation. Depicting the full scope of the industry's pursuit of farmers is nearly impossible because many cases are settled by confidential out-of-court settlements. Nonetheless, public records and anecdotal accounts paint a vivid picture of widespread investigation of farmers.

According to interviewed farmers, hired investigators trespass on farmers' property to take photos or crop samples; make threats and engage in harassment; adopt disguises (e.g., pretend to be conducting surveys of seed and chemical purchases); and even engage in entrapment-like activity.⁴ Some investigations are confrontational, involving public threats and belligerent conduct.⁵ (Our 2005 *Monsanto v. U.S. Farmers* covered many of these examples.)

One federal court summarized Monsanto's "scorched-earth" methods of enforcement as follows:

In order to protect its patents, Monsanto sent 'agents' into the farming community to ensure that farmers were not purchasing Roundup Ready seed, harvesting it, saving seed from the crop and then planting second generation Roundup Ready seed the next season. Under the patents, farmers were obligated to purchase new Roundup Ready seed each year and were prohibited from saving second generation seed. This changed the way farmers had done business as traditionally they saved seed, cleaned it and replanted it the following year. The scorched-earth policies used by Monsanto in enforcing the single-use restriction against farmers in some instances altered the customary neighborly relationships for which farmers are known. Instead of helping each other with barn-raising and equipment sharing, those caught saving seed, a practice that is hundreds of years old, were turned into 'spies' against their neighbors, replacing the atmosphere of cooperation with one of distrust and suspicion.⁶

While some farmers are knowingly saving seed, research and interviews also show that investigations are frequently intrusive and sometimes a product of erroneous or fabricated evidence. Such was the case when, for example, an Illinois soybean farmer couple found themselves under investigation by Monsanto for alleged seed patent infringement, only to discover that the husband's signature had been forged on the technology use agreement.

The couple was unaware that saving seeds and replanting them was illegal under Monsanto's technology agreement because the company failed to present the agreement to them for their signatures. Upon examination of the contract, it was clear that

the husband's signature had been forged. It was signed "Tony," and he always signed his name "Anthony." The couple remained under continual investigation and harassment, and eventually, with no further financial resources to defend themselves, signed a confidential settlement with Monsanto.⁷

Similarly, David Runyon, an Indiana corn and soybean farmer, was investigated by Monsanto using questionable tactics. Monsanto accused Runyon of illegally growing its patented GE soybean, despite the fact that for several years he had always purchased public, non-patented soybean seed from local universities.⁸ Monsanto pointed to his purchasing pattern of the herbicide glyphosate, often used on GE soybean crops, as evidence. Monsanto's attorney claimed that the company had an agreement with the Indiana Department of Agriculture to search his land; however, at the time of the purported infringement, the Indiana Department of Agriculture did not exist.⁹ Ultimately, Monsanto was unable to present a copy of this alleged agreement and dropped its investigation. However, the protracted investigation required considerable financial resources of Mr. Runyon.

David Brumback, a Missouri farmer, found himself under investigation because he was a customer of the Pilot Grove grain elevator co-op, which was under investigation for cleaning Roundup Ready seeds. Yet Mr. Brumback never saved Roundup Ready seeds, and up until the investigation, had been a loyal Monsanto customer. The initial investigation targeted Mr. Brumback's father, seemingly unaware that he had passed away a decade earlier. Unperturbed, the investigators turned to David Brumback. A year-and-a-half later, Monsanto finally dropped the charges as a result of lack of evidence of wrongdoing.¹⁰

Monsanto is not the only seed company pursuing farmers with questionable tactics. Pioneer Hi-Bred

investigators impersonated farmers looking to buy wheat seeds from seed cleaner Dean Fischer, whom they suspected of illegally cleaning and selling their patented seed in 2005.¹¹ The case eventually settled out of court.

In 2012, DuPont, the world's second largest seed company, hired dozens of investigators to examine planting and purchasing records of Canadian farmers, as well as take samples from their fields for genetic analysis.

SEED CLEANERS ALSO UNDER THREAT

In *Monsanto v. Parr*, Monsanto sued Maurice Parr, the operator of a mobile seed and grain cleaning business.¹² Mr. Parr's seed cleaning business separates viable whole soybean seeds from stems, leaves, and dirt in preparation for replanting.¹³ Seed saving requires the services of seed cleaners, who use specialized equipment to remove chaff and weed seed from harvested seed to prepare it for planting and prevent the seeding of weeds along with the crop.

Mr. Parr was sued by Monsanto for "aiding and abetting" seed-saving farmers by cleaning seeds from harvests so that farmers could save and replant.¹⁴ He did not know if the seeds he cleaned were patented or not because seed cleaners do not perform genetic tests on a customer's seeds. Mr. Parr made clear to his clients that he was not responsible for enforcing seed patent agreements to which he was not a party. Monsanto sued him for inducing patent infringement, claiming his statements encouraged flouting of their patents.

Monsanto subpoenaed Mr. Parr's bank records without his knowledge, began contacting his clients, and for 14 months investigated Mr. Parr and his longtime friends and clients.¹⁵ Having accumulated over \$25,000 in legal fees before even setting foot in a courtroom and no longer able to afford legal representation, Mr. Parr was forced to settle out-of-court and submit to the strict provisions proposed by Monsanto.¹⁶ According to Mr. Parr, he lost almost 90 percent of his former customers, who are now afraid that association with him will lead to prosecution against them as well.¹⁷

In another case, the Pilot Grove grain elevator co-op in Missouri came under investigation after Monsanto received an anonymous call alleging that the co-op was cleaning customers' Roundup Ready soybeans seeds. (Monsanto maintains an anonymous hotline, urging farmers to turn in neighbors.)¹⁸ Monsanto subpoenaed the co-op's records, and eventually filed a patent infringement suit for the cleaning of patented seeds, claiming that the co-op should have been policing its own customers. The co-op initially refused to settle. However, Monsanto subpoenaed over 100 farmers, as well as five years of sales records, leading the co-op's attorney Steven H. Schwartz to conclude, "Monsanto is doing its best to make this case so expensive to defend that the co-op will have no choice but to relent."¹⁹ Eventually they did relent; in July 2008 the parties settled.

Pursuing seed cleaners has proven to be a valuable complement to seed companies' investigations of farmers. Mr. Parr's records led to the investigations and subsequent settlements with eleven of Parr's customers for patent infringement.²⁰ With the information gathered from Pilot Grove, Monsanto sued two farmers, negotiated settlements with 25 others, and accused at least one farmer, David Brumback (see page 28), of patent infringement simply because he was a customer of the co-op.²¹

PROSECUTING AMERICA'S FARMERS

Some farmers are not willing to acquiesce to the company's demands and are sued. In many cases, the final results of Monsanto's lawsuits against

farmers remain unknown, as they have ended in confidential settlements. Of those cases with publicly recorded monetary judgments, the data reveal a number of sizeable payments to Monsanto.

Depicting the full scope of the industry's pursuit of farmers is nearly impossible because many cases are settled by confidential out-of-court settlements.

As of January 2013, Monsanto filed 144 lawsuits based upon purported violations of its Technology Use Agreement and its patents on GE seed technology. These cases involve 410 farmers and 56 small businesses or farm companies, in at least 27 different states.²²

Seventy-two lawsuits ended in recorded damages awarded to Monsanto. Twenty-seven lawsuits ended in unrecorded damages awarded to Monsanto (confidential settlements). Fourteen lawsuits were dismissed, with no indication of whether damages were awarded to Monsanto. Eleven lawsuits were ongoing as of November 28, 2012.²³

Sums awarded to Monsanto in 72 recorded judgments against farmers totaled \$23,675,820.99. The largest judgment was \$3,052,800.00; the smallest judgment was \$5,595.00.²⁴

In many cases, the figures indicated may be lower than the actual payments farmers must pay because they may not include expert witness fees, post judgment interest, plaintiff's attorney fees, costs of testing fields, etc. For example, in *Monsanto Co et al v. Thomason et al*, which involved two plaintiffs, Monsanto Company and Delta Pine, the defendants not only had to pay \$447,797.05 to Monsanto and \$222,748.00 to Delta Pine in damages; they also faced additional fees to Monsanto of \$279,741.00 in attorney fees, \$57,469.13 in costs and advanced expenses, and \$75,545.83 for testing fields, as well as additional fees to Delta Pine

of \$82,281.75 in attorney fees and \$5,801.00 in costs and advanced expenses.²⁵

OUT-OF-COURT SETTLEMENTS

Finally, the above cited recorded cases and judgments fail to convey a true picture of the scope of the seed giants' aggressive actions against U.S. farmers. This is because as one federal district court concluded "[t]he vast majority of cases filed by Monsanto against farmers have been settled before any extensive litigation took place."²⁶ Press reports and Monsanto's own statements suggest that the company investigates roughly 500 farmers each year.²⁷ Under financial duress, many farmers who have been accused of patent infringement, even when based on insubstantial evidence, are forced to settle out of court rather than face an expensive and lengthy lawsuit to defend themselves.

In 2006, CFS used materials downloaded from Monsanto's website to determine the approximate scope and cost to farmers from these out-of-court settlements.²⁸ These documents showed that Monsanto had instituted an estimated 2,391 to 4,531 of "seed piracy matters" against farmers in 19 states. This is 20 to 40 times the number of reported lawsuits found in public records.

Pursuant to these settlements, farmers paid Monsanto an estimated \$85,653,601 to \$160,594,230.²⁹ These estimated settlements paid to Monsanto by farmers exceeds by four to eight times the total of recorded judgments (\$23.6 million).

Documents used to calculate these estimates have since been removed from Monsanto's website; for the past seven years, further documents have not been made available. Due to the confidential nature of these settlements, exact amounts farmers agree to pay Monsanto are often unavailable.

FOLLOWING THE LEADER: LITIGATION BY OTHER SEED GIANTS

As the dominant actor in seed biotechnology for the last decade or more, Monsanto has been the most aggressive to date in pursuing litigation against farmers and farm-related businesses. However, Monsanto is not the only company that prosecutes farmers for patent infringement based on saving or cleaning seed. Other seed giants such as Syngenta, Pioneer, and BASF also sue farmers to enforce their patents, and these lawsuits will only increase as these companies obtain more patents. Notably, unlike the vast majority of Monsanto cases, most of these investigations and lawsuits were pursued in defending non-GE seed patents.

Syngenta—the multinational corporation formed in 2000 by the merger of agribusiness giants Novartis and Astra-Zeneca, that now ranks third in total sales in the commercial agricultural seeds market—prosecutes seed companies for allegedly selling its patented seeds unmarked, in violation of Syngenta’s patent and trademark. In September of 2002, Syngenta sued six Arkansas seed companies, co-operative businesses, and seed cleaners for allegedly reselling its patented Coker Wheat.³⁰

Syngenta alleged that each of these companies sold and marketed the patented wheat to farmers with their own descriptions and at “a significantly lower price.”³¹ One case ended in settlement, with Syngenta being awarded a permanent injunction, the right to inspect the premises of the company for three years, and \$152,500 in damages.³² Three cases ended with settlements before trial,³³ and one case ended in a permanent injunction being granted to Syngenta after a default judgment was entered against the defendant.³⁴ One case proceeded to trial and ended in a jury verdict in favor of Syngenta.³⁵ Syngenta was awarded a permanent injunction, damages in the amount of \$135,000 plus interest, and over \$12,000 in costs.³⁶ The

United States Court of Appeals for the Federal Circuit later reversed this ruling,³⁷ and on remand the defendant was awarded trial costs in the amount of \$2,852.³⁸

As of January 2013, Monsanto filed 144 lawsuits based upon purported violations of its Technology Use Agreement and its patents on GE seed technology.

Another seed giant, Pioneer Hi-Bred International, has sued small seed companies and individual farmers over its patented soybeans. Like many of Monsanto’s cases, all of the documented lawsuits that Pioneer has brought against small farmers have ended in out-of-court settlement. In one case in 2005, Pioneer sued an Illinois couple and their seed company for cleaning and selling patented soybean seed.³⁹ The settlement ending that case indicated that Pioneer could continue to monitor the farmers’ business in the future for patent infringement, and that the farmers would be liable for \$50 in liquidated damages for each bushel of infringing soybeans discovered.⁴⁰ The company also sued a Missouri seed cleaner for cleaning and reselling its patented wheat seed without a license in 2005 but voluntarily dismissed its claims four months later,⁴¹ most likely because of a settlement.

Pioneer has not limited its patent prosecution to known violations. In 2009, based on anonymous “reports,” Pioneer sued two brothers in Illinois who had bought 750 bags of its seed and whom allegedly planned to save the seed for replanting.⁴² The settlement between the farmers and the company that ended this case required the farmers to submit to three years of inspections and crop testing by Pioneer, even though Pioneer conceded that the farmers denied any intent to breach Pioneer’s patent. The farmers also agreed to pay liquidated damages of \$50 per bag of seed equiva-

lent saved for replanting should they violate the terms of the injunction.⁴³

In May 2012, Pioneer initiated a lawsuit against five “John Does” whom it alleged “are offering to sell, selling, transferring and/or supplying Pioneer transgenic seed incorporating patented technology owned by Pioneer without license or authorization.”⁴⁴ Pioneer sought the court’s help in determining the identities of individuals advertising Pioneer seed on the Internet so that it could proceed to prosecute them for patent infringement and breach of contract. Pioneer voluntarily dismissed its claims two months later.⁴⁵

Finally, BASF—the self-declared “world’s leading chemical company”—has engaged in the same type of legal campaign against farmers. In 2004 it sued a sole proprietorship seed company and twenty five “John Does” for allegedly infringing its patent on herbicide resistant “Clearfield” rice. BASF also brought a claim of conversion in this lawsuit, alleging that the defendants deprived BASF of control over the patented seed without permission.⁴⁶ As part of a consent judgment, BASF

gained the right to sample crops and inspect the premises for three years (including through “undercover purchases”) and \$20,000 in damages from the company/owner.⁴⁷

In another Clearfield lawsuit against fourteen rice farmers and eleven small farm businesses and partnerships in Arkansas, the negotiated consent judgment held the defendants jointly and severally liable for \$2,500,000 and required all defendants to prove that the Clearfield seed was returned, and further, that the land where Clearfield rice was grown would be replanted with soybeans and treated with glyphosate herbicide. BASF also retained the right of inspection for three years.⁴⁸

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Finally, the following lawsuits represent recent, high profile cases that could potentially have significant impacts on the ability of the seed industry to litigate against farmers in the future and could even change some fundamental aspects of the present seed and plant patent regime.

BOWMAN v. MONSANTO CO.

In February 2013, the U.S. Supreme Court will review a federal appeals court decision that Vernon Hugh Bowman, a 75-year-old Indiana farmer, infringed upon Monsanto's patents when he purchased and planted soybean seeds from a grain elevator. The seeds purchased from this third party were sold as a mix of undifferentiated commodity seeds. Additionally, he signed no company technology agreement because Bowman purchased the seeds from a third party. Monsanto sued for patent infringement because the majority of plants from the second planting were identified as products of Roundup Ready seeds.

Bowman's case centers on a doctrine known as "patent exhaustion." This doctrine holds that the first authorized sale of a patented item ends, or "exhausts," a patentee's (in this instance, Monsanto's) right to control the further use of that item. In this case, the patent exhaustion doctrine would mean that Mr. Bowman or others in pos-

session of such seed could not be restricted on their use via patent law, and would be free to replant seeds if they wished. Patent exhaustion limits a patent holder's ability to hold a monopoly and receive royalty payments in perpetuity.

Center for Food Safety (CFS) and Save Our Seeds (SOS) filed a brief at the Supreme Court in support of Mr. Bowman. In our brief we explained that applying the doctrine of patent exhaustion would restore farmers' right to save seed in some circumstances. The brief also included other reasons to advocate for patent exhaustion including that it would help to curb seed oligopoly, limit seed giants' practice of farmer prosecution, among other issues. (See the Amicus Brief at www.centerforfoodsafety.org.) The Court's upcoming decision in *Bowman* on these issues may have broad ramifications for the future of seed independence in the U.S. and for the future of U.S. agriculture generally.

ORGANIC SEED GROWERS & TRADE ASS'N v. MONSANTO CO.

In 2011, the Organic Seed Growers and Trade Association (OSGATA) filed a lawsuit on behalf of 60 family farmers, seed businesses and organic agricultural organizations against Monsanto to challenge the chemical giant's patents on GE seed. The organic plaintiffs were forced to sue preemptively to protect themselves from being accused of patent infringement should they ever become contaminated by Monsanto's GE seed, something Monsanto has done to other farmers in the past.

Rather than provide plaintiffs with a binding promise that they would never sue them for patent infringement upon contamination, Monsanto filed

a motion to dismiss the case. In February 2012, the District Court judge dismissed the case, aligning with Monsanto by finding that the plaintiffs' concerns over being contaminated with Monsanto's GE seed and then being accused of patent infringement were unreasonable. Plaintiffs appealed this decision to the Court of Appeals for the Federal Circuit, which heard oral argument early in 2013. The decision of the Court is pending.

CFS is a plaintiff in this case, joining organic farmers and proponents of sustainable agriculture from around the country and around the globe.

ASSOCIATION FOR MOLECULAR PATHOLOGY v. MYRIAD GENETICS, INC.

Association for Molecular Pathology v. Myriad Genetics, Inc. is not about seeds directly, but rather about the broader question of whether genes themselves are patentable subject matter. Since the 1980 landmark case *Diamond v. Chakrabarty*, in which the Supreme Court ruled by a 5–4 margin that living organisms could be patented, corporations have raced to patent genes and their informational DNA sequences.

One such company, Myriad Genetics, removed from the body (or “isolated”) several genes that correlate to increased risk to a type of breast cancer, known as the Breast Cancer Susceptibility Genes 1 and 2 (BRCA or BRCA1–2). Myriad then created expensive genetic testing and used their patents to prevent others from providing the tests to cancer patients. Of particular concern to the researchers and others is the effect the gene patents have on the growth and development of medical research, as well as the accessibility of life-

saving cancer screening tests that require use of the patented genes.

The Court will hear argument in the case in spring 2013, with a final decision later this year. While framed in the context of human genes, the Court’s decision will likely impact the ability of corporations, including the seed giants, to patent genes more broadly, including germplasm. Genes, whether in plants or humans, are products of nature, and as the carriers of DNA, genes also literally embody laws of nature. As such they are not patentable subject matter; they are part of the common heritage and public domain and should be protected in the public trust.

CFS, on behalf of a coalition of environmental and public interest organizations, filed briefs in support of the plaintiffs at each stage—district court, Federal Circuit, and the Supreme Court (see www.centerforfoodsafety.org).

POLICY OPTIONS: REFORMING THE CURRENT SEED AND PLANT PATENT REGIME



The actions and inactions of United States legislators, regulators, and courts have allowed, and often encouraged, seed giants' use of patent law as a weapon against the American farmer. And, as discussed in this report, patent law is a significant contributor toward increased seed market concentration, rising seed prices, reduced seed innovation, suppression of independent scientific research, and environmental harms.

Governmental activities that have helped trigger the persecution of U.S. farmers by these companies include, but are not limited to: U.S. Courts, including the Supreme Court, allowing the United States Patent and Trademark Office (USPTO) to grant utility patent protection to GE, or transgenic, crops

(and other sexually reproducing plants, i.e., seeds); federal and state regulators failing to appropriately regulate the environmental impacts of GE crops, resulting in the indiscriminate spread of patented transgenic seeds and genes; local and state officials' failure to intervene to halt Monsanto's use of hyper-aggressive and often illegal investigations of purported violations of its seed patents; and the U.S. courts' failure to invalidate Monsanto's exploitative contracts with farmers who use its patented seed.

There is a growing movement to reverse and reform governmental policies contributing to the numerous adverse socio-economic and environmental impacts of the present seed patent regime and the harassment, investigation, and prosecution of U.S. farmers. The following is a summary

overview of selected policy options that could be utilized to defend farmers and ensure that seeds—the first link in our food chain—remain accessible

as part of the public domain. Some of them could be affected by the outcomes of the three pending cases discussed in this report.

AMEND THE PATENT ACT SO THAT SEXUALLY REPRODUCING PLANTS ARE NOT PATENTABLE SUBJECT MATTER AND AMEND THE PLANT VARIETY PROTECTION ACT (PVPA) TO EXCLUDE SUCH PLANTS FROM PROTECTION UNDER THE PVPA.

Seed giants can obtain two kinds of intellectual property protection for its GE seeds. As discussed in Chapter One, it can and has obtained utility patents on its GE seeds from the USPTO. These utility patents provide the company with monopoly-like control of its seed and exclude all others from any possession, use, or sale of the seed unless approved by the patent holder. Seed corporations can receive additional protection for their GE seed by obtaining a Certificate of Protection from the USDA under the PVPA.

The PVPA was enacted in 1970 and provides developers of new plant varieties with patent-like protection for their novel varieties. The owner of a U.S. Certificate of Protection for a seed or plant variety has exclusive rights to multiply and market the seed of that variety for a term of 20 years. Unlike a utility patent protection, however, there are exemptions under the PVPA that allow some use of the protected variety. Most importantly for farmers, the PVPA creates a right to save seed for replanting; it also allows scientists to conduct critical research.

With respect to transgenic crops, arguably, GE crops are entitled to neither a utility patent nor a Certificate of Protection because Congress has never affirmed the USPTO's granting of utility patents on plants, nor were GE varieties even in existence when the PVPA was passed in 1970. Some have argued that given the genetic instability and tendency of gene-altered seeds to mutate, any form of patent or PVPA protection for such seeds is scientifically suspect and legally unsound. Others note that because agrichemical companies cannot control the spread of proprietary seeds or the

altered genes in these seeds, any granting of protection of these seeds or their genetic contents will inevitably lead to numerous innocent parties being subject to patent or PVPA enforcement. Over time, any and every farmer of a given crop may have his or her crop polluted with the GE variety of that crop, leading to a legally chaotic scenario where virtually every farmer in the United States is an infringer of the plant protections for GE crops.

The Patent Act and the PVPA are federal legislation; therefore, amending them to remove protection for transgenic varieties and sexually reproducing plants would require action by Congress. Additionally, the judicial interpretation of what genetic material qualifies as patentable subject matter and what are instead products of nature and/or laws of nature, and thus not patentable, may be impacted by the upcoming Supreme Court decision in *Association for Molecular Pathology v. Myriad Genetics, Inc.* While the Court is unlikely to discuss patents on transgenic plants, it will address patents on “isolated” genes, DNA, and complementary DNA (cDNA), and many agricultural biotechnology entities have such patents.

PROS: The advantage of this option for farmers is that it would eliminate all legislative basis for their prosecution by seed companies for patent infringement or PVPA violation.¹

CONS: The disadvantages of this approach are practical. Given the lobbying power of the agricultural biotechnology industry, it is extremely unlikely that Congress would take such action in the foreseeable future.

AUTHORIZE THE PLANT VARIETY PROTECTION ACT (PVPA) AS THE EXCLUSIVE MEANS OF SECURING INTELLECTUAL PROPERTY PROTECTION OVER SEXUALLY REPRODUCING PLANTS.

A less dramatic legislative option than stripping transgenic and other seeds from all plant protection would be for Congress to amend the Patent Act to exclude sexually reproducing plants, including GE seeds, as patentable subject matter, but to continue to allow engineered plants protection under the PVPA. This would provide the biotech companies with a continued monopoly on the sale of these crop varieties, but under the PVPA, an exemption would allow farmers to save seeds for replanting.

PROS: This option requires Congress to amend just one statute—the Patent Act—rather than both the Patent Act and the PVPA as required for the first option, meaning one less legislative hurdle. As

noted, this option would result in farmers being able to save and replant proprietary seed without fear of prosecution.

CONS: Amending the Patent Act would not free farmers from enforcement of, and prosecution under, the PVPA. For example, farmers may still be prosecuted even if protected seed varieties inadvertently pollute their crop. Additionally, even though less controversial than stripping transgenic seeds of all intellectual property protection, Congress, under pressure from the agricultural seed industry, may well be reluctant to amend the Patent Act to favor a farmer’s right to save seed over the profit interest of corporations.

AMEND THE PATENT ACT, AND/OR HAVE A COURT DECIDE: 1) PATENT RIGHTS EXHAUST AFTER THE FIRST AUTHORIZED SALE; AND 2) FARMERS CANNOT BE SUED FOR NATURALLY REPRODUCING SEEDS FROM A PATENTED VARIETY.

Another option would be to amend the Patent Act so that patent rights are exhausted by the first authorized sale and so that reproducing seeds through the normal course of farming does not violate the Patent Act by improperly “making” a patented product. These are essentially the two issues the Court could decide in *Bowman v. Monsanto* (see Chapter Three).

PROS: A judicial interpretation or statutory amendment providing that seed patent rights exhaust, or end, after the first authorized sale would release farmers from onerous patent prosecution for seed saving or from contamination. Patent prosecution carries with it the specter of treble damages, oftentimes a strong incentive to settle, regardless of the merits of a case. Patent exhaustion after the first authorized sale would mean that once

farmers purchased seed from a licensed dealer, the patent holder could not use patent law to place conditions on its use, such as forbidding seed saving.

A court decision or amendment to patent law establishing that when a farmer through normal farming practices produces seeds, he or she is not improperly “making” a patented invention would have a similar beneficial impact. It would protect farmers from patent prosecution for the next generations of seed they produce from a patented variety. Such a court ruling or amendment would recognize the logical fact that farming is not genetic engineering and that it is not an illegal act when seeds self-reproduce.

CONS: As with the other Congressional options, passing a statutory amendment is seemingly very

unlikely in the current political climate. Therefore, the best chance for this policy option is a favorable decision in the *Bowman* case. Additionally, even if through legislation or a favorable Supreme Court

judicial decision patent protections were curtailed, corporation patent holders could still control seed use through contracts that farmers must sign upon purchasing seeds.

AMEND THE PATENT ACT SO THAT SEED SAVING AND/OR INADVERTENT POSSESSION, USE, OR SALE OF SEEDS IS NOT CONSIDERED INFRINGEMENT.

Section 271 of the Patent Act defines what constitutes infringement of a patent. This can include exemptions from the usual prohibition of possession, use, and sale of a patented invention.² This policy option would involve amending Section 271 so as to limit the scope of infringement of patents on a seed. Specifically, this would involve excluding the saving of GE seed and/or the inadvertent possession, use, or sale of such seed from the scope of patent infringement.

Judicial language on the patenting of a chemical compound gives some support to this policy option. In a concurring opinion in *SmithKline Beecham Corp. v. Apotex Corp.*, 365 F.3d 1306 (Fed. Cir. 2004), one federal court of appeals jurist opined that the biological spread of a patented plant onto the fields of a non-adopting farmer could not lead to patent infringement:

Consider, for example, what might happen if the wind blew fertile, genetically modified blue corn protected by a patent, from the field of a single farmer into neighboring cornfields. The harvest from those fields would soon contain at least some patented blue corn mixed in with the traditional public domain yellow corn, thereby infringing the patent. The wind would continue to blow, and the patented crops would spread throughout the continent, thereby turning most (if not all) North American corn farmers into unintentional, yet inevitable, infringers. The implication that the patent owner would be entitled to collect royalties from every farmer whose cornfields contained

even a few patented blue stalks, cannot possibly be correct.³

This decision suggests that the federal courts may also be a viable option for at least establishing the principle that transgenic pollution cannot be considered a legal cause of action for an infringement action on an engineered seed patent.

Moreover, this subject is also the crux of the *OSGATA et al. v. Monsanto Co.* litigation, seeking relief such that patented germplasm, as applied in the unintended contamination context, cannot be grounds for patent infringement. A successful outcome to that litigation, or other subsequent litigation similar to it, could establish the same result as amending Section 271.

PROS: This approach is not as intrusive as removing all patent protection from GE crops and therefore may be more acceptable to Congress. As discussed above and illustrated by the *OSGATA* case, the courts might be a more practical and efficient vehicle than Congress for establishing that transgenic pollution cannot be patent infringement. This option would result in conventional and organic farmers being able to save seed without fear of prosecution and without fear that being contaminated will turn them into patent infringers.

CONS: To the extent that this approach continues to rely on Congressional action against the interest of agricultural biotechnology companies, there will almost certainly be continued strong resistance

from this industry's allies in Congress. As the *OSGATA* case shows, any successful route through the courts is inherently uncertain. As a more fundamental matter, for some farmers and others this approach will be untenable because it requires the acceptance of the patenting of seeds. Furthermore,

a narrow approach that only exempted unintentional contamination from infringement, while important, would not ameliorate the broader harms such as the inability to save patented seed or the restriction of independent research the way the first two options would.

LEGISLATE TO PREVENT SEED GIANTS FROM SHIFTING LIABILITY ONTO THE FARMER.

As this report describes, it is the nature of seeds to travel via pollen flow or through seed movement via animals or equipment. As noted earlier, Monsanto's Technology Use Guide recognizes this fact of nature by stating that "[i]t is generally recognized in the industry that a certain amount of incidental, trace level pollen movement occurs, and it is not possible to achieve 100 percent purity of seed or grain in any crop production system."⁴ Such pollen flow and seed movement presents a direct economic threat to farmers growing non-genetically engineered and organic products, as well as irreparable harm in the form of lost markets, reputation, and the loss of the fundamental right to sow the crop of their choice. Nonetheless, seed giants explicitly attempt to shift the liability for such contamination away from themselves and onto the farmer whose field has been contaminated.

taminated farmers from any liability.

For example, Indiana, Maine, and California have each passed "Farmer Protection Acts," which, among other provisions, provide farmers some protection from unintended transgenic contamination.⁵ Under these laws, if the presence of the proprietary product is not intended by the farmer, then he or she cannot be held liable for breach of a seed contract.

PROS: Such legislation, at the federal and particularly on the state level, may have a good possibility of success. This type of legislation would ensure that farmers are not punished for the inherent polluting nature of transgenic seeds and also reinforce the recourse of contaminated farmers who, instead of being sued by Monsanto for patent infringement, can take legal action against the company for any losses caused by this contamination.

CONS: This legislation, whether passed at the federal or state level, does not limit the intellectual property protections of the seed giants, which could still prosecute farmers for seed saving and for inadvertently having the patented seed on their property.

Federal and state policymakers have begun to address this inequitable situation through the drafting of legislation that will hold seed companies liable for the spread of their patented genetic technology through pollen dispersal, seed contamination, or other means—or at a minimum, protect con-

ADOPT EXISTING STATE MODELS FOR CONTROLLING INTRUSIVE AND AGGRESSIVE PATENT INFRINGEMENT INVESTIGATIONS OF FARMERS.

As discussed in this publication, numerous farmers have been the subject of harassment and overzealous investigations by seed giants. States can act to curb such behavior and ensure that farmers

accused of infringing patents have some equitable recourse, and several have so acted. Five states—California, Indiana, Maine, North Dakota, and South Dakota—have passed legislation to protect

farmers from aggressive legal pursuits by seed corporations.⁶ Most significantly, several state farmer protection laws prevent plant patent holders from entering and taking crop samples from a farmer's land without meeting a number of conditions. In addition, the farmer may accompany the patent holder as samples are taken and may also request the presence of the state department of agriculture. These procedural protections are important because they deter patent holders from engaging in unlawful activities.

For example, in 2003, Indiana passed a bill that provides that a seed contract gives no rights to a seed supplier to enter a farmer's property to take samples of crops grown from seeds or other plants growing on the farmer's property unless a number of important conditions are met, such as written notice.⁷ North Dakota requires the patent holder to obtain a farmer's permission to enter his property and take samples.⁸ Under these laws, a seed contract gives no rights to a seed supplier to enter a farmer's property to take samples of crops grown from seeds or other plants growing on the farmer's property unless the patent holder follows important procedures.⁹ Moreover, if a seed company receives a court order to access a farmer's land to take samples, the order must allow the farmer to have independent, matching, or split samples taken. Farmers can use these independent samples to conduct their own tests. This open and honest process has put a stop to the heretofore one-sided nature of the evidence presented in cases previ-

ously filed by patent holders against farmers (documented in Chapter Three of this report).

Notably, these bills have been effective deterrents against lawsuits in these states. In South Dakota, seed companies have filed only one lawsuit since the enactment of its 2002 law. The same is true in North Dakota. In contrast, in Missouri, a state without a farmer protection law, Monsanto has filed 19 lawsuits against farmers. In neighboring Illinois, Monsanto has filed 14 lawsuits, more than the total suits filed in the states with farmer protection laws.

PROS: As demonstrated by the success in California, Indiana, Maine, North Dakota, and South Dakota, these bills can be popular with state legislatures. These laws offer farmers some protection against the harassing and/or illegal methods of investigation by patent holders, the potential falsifying of test results, and liability for unintended contamination.

CONS: These laws do nothing to limit seed companies' patent and intellectual property rights. Further, there is a danger that legislatures might look to these bills as an easy way to sidestep their obligations resulting from transgenic contamination caused by GE crops and also not address broader issues, such as the fundamental right of farmers to save their seed and the socio-economic and environmental concerns highlighted in this report.

LEVEL THE COURTROOM PLAYING FIELD BY NEGATING SEED INDUSTRY FORUM SELECTION CLAUSE.

Seed contracts usually stipulate that patent infringement cases be tried in the home state of the patent holder, meaning farmers defending themselves in these cases face expensive travel costs and legal expenses and have an inherent disadvantage of litigating a case on the company's home turf. For

example, Monsanto's technology agreement provides terms that place farmers at a distinct disadvantage should they be sued for breach of the agreement or patent infringement. The agreement mandates that the sole and exclusive jurisdiction and venue for all disputes, except those involving cotton, go to the

U.S. District Court for the Eastern District of Missouri, Monsanto's hometown. This means a farmer sued in states outside of Missouri not only has the David and Goliath battle against Monsanto's attorneys, but also must find a lawyer in Missouri and travel there to fight out the legal battle.

Both Indiana and Maine have passed legislation that alleviates this hardship and inequity. Indiana's law mandates that if a seed company files a lawsuit against a farmer for violating the terms of a seed contract, the court action must be filed in Indiana, as the laws of Indiana govern a seed contract. In Maine, an infringement case brought against a

grower who does not have a current contract with a seed company must be brought in a venue where the farmer resides.¹⁰

PROS: Laws such as Indiana's ensure that farmers being prosecuted are not required to defend themselves in, and under the laws of, another state.

CONS: These laws, while providing some procedural protection, still do little to limit the patent holders' intellectual property rights. Again, there is a risk that legislators may opt for limited laws such as these rather than stringently regulate liability limits in their states.

PASS FEDERAL, STATE, AND LOCAL INITIATIVES INSTITUTING A BAN OR MORATORIUM ON THE GROWING OF GENETICALLY ENGINEERED CROPS.

As previously noted, most federal, state, and local governments have yet to appropriately regulate transgenic crops in a manner that prevents the economic and environmental consequences caused by their ubiquitous spread. A federal ban or moratorium on the planting of GE crops would eliminate the use of the patented technology and therefore make persecution of farmers impossible. Less expansive than national action would be bans or moratoria at the state and/or local level.

Several counties and cities in California, Hawaii, Washington, and Maine have already adopted ballot measures or county supervisor resolutions to ban the growing of GE crops in their counties. As of the publication of this report, Santa Cruz, Mendocino, Marin, and Trinity counties and the City of Santa Cruz in California, Hawaii and Maui counties in Hawaii, San Juan County in Washington, and the Town of Montville in Maine have passed such initiatives and resolutions.¹¹ In these cities and counties, it is unlawful for any person to

propagate, cultivate, raise, or grow GE crops. Several other counties are currently in the process of proposing bans, and these efforts seem to be gaining momentum.¹²

PROS: Local and county bans have a track record of being more politically achievable than state or federal bans. All such measures offer significant protection for farmers in the geographic area encompassed by the ban or moratorium from transgenic contamination by GE crops and the attendant risk of being prosecuted by seed companies for patent infringement.

CONS: It is extremely unlikely that Congress would ever legislate a national ban or moratorium. State bans are more feasible but still very unlikely. County-wide bans are very viable, but the limited geographic scope of these bans makes for limited protection for most of the nation's farmers unless such bans become more widespread.

ENDNOTES



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¹⁷ See 7 USC § 2543 ("[I]t shall not infringe any right hereunder for a person to save seed produced by the person from seed obtained, or descended from seed obtained, by authority of the owner of the variety for seeding purposes and use such saved seed in the production of a crop for use on the farm of the person ...");

See 7 U.S.C. § 2544 ("The use and reproduction of a protected variety for plant breeding or other bona fide research shall not constitute an infringement of the protection provided under this chapter"). The utility patent statute does not contain similar exemptions.

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³⁶ Fernandez-Cornejo, “The Seed Industry in U.S. Agriculture,” 25–28. While the 1970 PVPA initiated the wave of mergers and acquisitions, it accelerated rapidly in the 1980s, spurred by development of biotechnology and the ability to obtain the stronger and more flexible protection afforded by utility patents on genes and plant parts as well as whole plant varieties.

³⁷ *Ibid*, Figures A-1 to A-4, pp. 32–35. Note that portions of the Advanta Group (Figure A-4) have since been acquired by Monsanto, Syngenta and Limagrain.

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- ⁵³ Ibid.
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- ⁵⁵ Anonymous public comment, “Comment on Federal Insecticide, Fungicide, and Rodenticide Act Scientific Advisory Panel Meeting Pertaining to Resistance Risks from Using a Seed Mix Refuge with Pioneer’s Optimum® AcreMax™ 1 Corn Rootworm-Protected Corn.”
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- ⁵⁹ In the U.S. alone, 180–185 million lbs. of glyphosate were used in agriculture in 2007. See: EPA, “Pesticide Industry Sales and Usage: 2006 and 2007 Market Estimates,” *Environmental Protection Agency*, (February 2011): Table 3.6.
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- ⁶¹ Benbrook, “Impacts of Genetically Engineered Crops on Pesticide Use in the United States: The First Thirteen Years,” 47 & Supplemental Table 7.
- ⁶² “Waterhemp Rears Its Ugly Head...Again,” *ScienceDaily*, January 26, 2011. <http://www.sciencedaily.com/releases/2011/01/110126121738.htm>
- ⁶³ Stephen B. Powles, “Gene Amplification Delivers Glyphosate-resistant Weed Evolution,” *Proceedings of the National Academy of Sciences* 107 (January 19, 2010): 955–56. <http://www.pnas.org/content/107/3/955.full>
- ⁶⁴ Kenneth P. Cantor, “Pesticides and Other Agricultural Risk Factors for Non-Hodgkin’s Lymphoma Among Men in Iowa and Minnesota” *Cancer Res* 52 (1992): 2447–55.; Claudine Samanic, et al., “Cancer Incidence Among Pesticide Applicators Exposed to Dicamba in the Agricultural Health Study,” *Environmental Health Perspectives* 114 (2006): 1521–26.

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- ¹ See Monsanto Co., *2013 Technology Use Guide*. <http://www.genuity.com/stewardship/Documents/TUG.pdf>
- ² See, e.g., Pioneer Hi-Bred, *2013 Terms and Conditions of Purchase*, para. 2, “Terms of Sale.” <https://www.pioneer.com/home/site/us/my-farm-accounts/my-accounts/termsConditions/> (last accessed February 6, 2013), stating: “If seed contains a transgenic trait, a conditional right must first be obtained under any intellectual property covering the transgenic trait before the seed can be used in any way. A conditional right for any use, including planting, of seed containing a transgenic trait may ONLY be obtained under a valid, legally binding Pioneer Technology Agreement.”
- ³ Monsanto Co., *2011 Technology/Stewardship Agreement*, para. 5, “Grower Receives from Monsanto Company.” The 2011 version of Monsanto’s TUA is the version of the contract now in-effect for participating farmers.
- ⁴ Syngenta Seeds Inc., *2011 Stewardship Agreement*, “Grower’s Limited Use License(s).”
- ⁵ Dow AgroSciences, *2012 Technology Use Agreement*, para. 4. “Stewardship and Compliance.” http://www.dowagro.com/na/usa/en/traistwd/das_tech_use_agreement_november_2012.pdf

CHAPTER TWO continued

- ⁶ See Monsanto Co., *2011 Technology/Stewardship Agreement*, para. 4, “Grower Agrees”; Dow AgroSciences, *2012 Technology Use Agreement*, para. 4. “Stewardship and Compliance”; Syngenta Seeds Inc., *2011 Stewardship Agreement*, “General Provisions.”
- ⁷ Monsanto Co., *2011 Technology/Stewardship Agreement*, para. 4, “Grower Agrees.”
- ⁸ *Ibid.*
- ⁹ *Ibid.*
- ¹⁰ *Ibid.*
- ¹¹ See, e.g., Syngenta Seeds Inc., *2011 Stewardship Agreement*, “General Provisions”; Monsanto Co., *2011 Technology/Stewardship Agreement*, para. 4, “Grower Agrees.”
- ¹² *Ibid.*
- ¹³ Monsanto Co., *2013 Technology Use Guide*, 2-3.
- ¹⁴ Monsanto Co., *2011 Technology/Stewardship Agreement*, para. 4, “Grower Agrees.”
- ¹⁵ *Ibid.*
- ¹⁶ *Ibid.*
- ¹⁷ *Ibid.*
- ¹⁸ Pioneer Hi-Bred, *2013 Terms and Conditions of Purchase*, para. 2, “Terms of Sale” and para. 18, “Plant Variety Protection Act (PVPA).”
- ¹⁹ *Ibid.*, para. 2, “Terms of Sale”.
- ²⁰ Dow AgroSciences, *2012 Technology Use Agreement*, para. 2, “Limited License.”
- ²¹ *Ibid.*
- ²² See Syngenta Seeds Inc., *2011 Stewardship Agreement*, “Grower Responsibilities.”
- ²³ Monsanto Co., *2013 Technology Use Guide*, 8-9.
- ²⁴ See, e.g., *Jurgens v. CBK, Ltd.*, 80 F.3d 1566, 1570 n.2 (Fed. Cir. 1996).
- ²⁵ See, e.g., Monsanto Co., *2011 Technology/Stewardship Agreement*, para. 4, “Grower Agrees.”
- ²⁶ *Ibid.*, para. 8, “General Terms.”
- ²⁷ *Ibid.*, para. 9, “Termination.”
- ²⁸ CFS is aware of sixteen cases against farmers that have ended in bankruptcy

CHAPTER THREE

- ¹ Peter Shinkle, “Monsanto Reaps Some Anger with Hard Line on Reusing Seed.” *St. Louis Post Dispatch*, May 19, 2003. <http://www.mindfully.org/GE/2003/Monsanto-Reaps-Anger12may03.htm>
- ² Jack Kaskey, “DuPont Sends in Former Cops to Enforce Seed Patents: Commodities,” *Bloomberg*, November 28, 2012. <http://www.bloomberg.com/news/2012-11-28/duPont-sends-in-former-cops-to-enforce-seed-patents-commodities.html>
- ³ *Ibid.*
- ⁴ Center for Food Safety, *Monsanto vs. U.S. Farmers* (Washington, DC: Center for Food Safety, 2005), 23-28. <http://www.centerforfoodsafety.org/pubs/CFSMonsantovsFarmerReport1.13.05.pdf><http://www.centerforfoodsafety.org/pubs/CFSMonsantovsFarmerReport1.13.05.pdf>
- ⁵ *Ibid.*, 25-26; See also Donald Barlett & James Steele, “Monsanto’s Harvest of Fear,” *Vanity Fair*, May 2008. <http://www.vanityfair.com/politics/features/2008/05/monsanto200805>
- ⁶ *Stratemeyer v. Monsanto Co.*, No. 02-CV-505, slip op. at 3-4 (S.D. Ill. March 28, 2005) (footnote omitted).
- ⁷ Illinois farmer, telephone conversation with CFS staff member, January 28, 2013.
- ⁸ Jean Snedegar, “GM battles rage down on the farm,” *BBC News*, February 17, 2009. <http://news.bbc.co.uk/2/hi/business/7892328.stm>
- ⁹ Kristina Hubbard, *Out of Hand: Farmers Face the Consequences of a Consolidated Seed Industry*, (Washington, DC: National Family Farm Coalition, December 2009), 47. <http://www.farmertofarmercampaign.com/Out%20of%20Hand.Full-Report.pdf>
- ¹⁰ David Brumback, telephone conversation with CFS staff member, January 30, 2013.
- ¹¹ Pioneer Hi-Bred International Inc. v Dean Fischer, compl. (W.D. MO, November 1, 2005).

- (according to a search done on the PACER database for bankruptcy cases between 1997 & 2013 in which Monsanto is listed as a party). This number does not reflect cases in which defendant farmers are driven to bankruptcy and then settle with Monsanto as part of a bankruptcy plan. This information demonstrates that at the minimum over 11% of farmers sued in these cases are bankrupted.
- ²⁹ See Monsanto Co., *2011 Technology/Stewardship Agreement*, para. 9, “Termination”; Dow AgroSciences, *2012 Technology Use Agreement*, para. 9, “Additional Provisions”; Syngenta Seeds Inc., *2011 Stewardship Agreement*, General Provisions.
- ³⁰ 35 U.S.C. § 284 (2013).
- ³¹ See, e.g., *In re Trantham*, 304 B.R. 298 (B.A.P. 6th Cir. 2004); *In re Wood*, 309 B.R. 745 (Bankr. W.D. Tenn. 2004); *In re Roeder*, No. 07-01422S, 2009 Bankr. LEXIS 3949 (Bankr. N.D. Iowa Dec. 14, 2009); see also, e.g., *Monsanto Co. v. Strickland*, No. 2:11-ap-80201 (Bankr. D. S.C. Mar. 5, 2012); *-Monsanto Co. v. Slusser*, No. 3:11-ap-01170 (Bankr. E.D. Ark. filed May 10, 2011); *Monsanto Co. v. Harden*, No. 2:10-ap-616 (Bankr. W.D. Tenn. Aug. 5, 2011).
- ³² Monsanto Co., *2011 Technology/Stewardship Agreement*, para. 3, “Forum Selection for Non-Cotton-Related Claims Made By Grower and All Other Claims.”
- ³³ Pioneer Hi-Bred, *2013 Terms and Conditions of Purchase*, para. 16, “Consent to Jurisdiction/Venue.”
- ³⁴ *Monsanto v. McFarling*, 302 F.3d 1291, 1300-01 (Fed. Cir. 2002) (Clevenger, J., dissenting).
- ³⁵ Monsanto Co., *2011 Technology/Stewardship Agreement*, para. 2, “Binding Arbitration for Cotton-Related Claims Made by Grower.”
- ³⁶ *Ibid.*, para. 4, “Grower Agrees.” (“If Grower fails to pay Monsanto for cotton related Monsanto Technologies, Grower agrees to pay Monsanto default charges at the rate of 14% per annum (or the maximum allowed by law whichever is less) plus Monsanto’s reasonable attorneys’ fees, court costs and all other costs of collection.”)
- ³⁷ Center for Food Safety, *Monsanto vs. U.S. Farmers November 2007 Update* (Washington, DC: Center for Food Safety, 2007), 2. <http://www.centerforfoodsafety.org/pubs/Monsanto%20November%202007%20update.pdf>
- ³⁸ See Cal. Food & Agric. Code § 52305 (2008); Ind. Code §§ 15-15-6-11, 15-15-7-1 through 15-15-7-12 (2003); Me. Rev. Stat. Ann. tit. 7, § 1053 (2007); N.D. Cent. Code § 4-24-13 (2011); S.D. Codified Laws §§ 38-1-44 through 38-1-50 (2002).
- ¹² *Monsanto v. Parr*, 545 F. Supp. 2d 836 (N.D. Ind. 2008). http://www.fr.com/files/uploads/publications/DSU-Medical-Corp-v-JMS-Co-Ltd/Monsanto_v_Parr_NDIN_4-07-cv-00008_Apr_22_2008.pdf
- ¹³ *Ibid.*, 838.
- ¹⁴ *Ibid.*, 9.
- ¹⁵ Gordon Moyes, “GM crops and legal risks for farmers – what are we risking?” March 20, 2009. <http://www.gordonmoyes.com/2009/03/20/gm-crops-and-legal-risks-for-farmers-what-are-we-risking/>
- ¹⁶ *Food, Inc.*, Produced by Robert Kenner and Elise Pearlstein, Participant Media, (2009).
- ¹⁷ *Monsanto v. Parr*, 545 F. Supp. 2d 836 (N.D. Ind. 2008).
- ¹⁸ Center for Food Safety, *Monsanto vs. U.S. Farmers*, 23.
- ¹⁹ Alan Scher Zagier, “Monsanto Patent Fight Ensnares Missouri Farm Town,” Associated Press, July 10, 2008. <http://www.grain.org/article/entries/2240-monsanto-patent-fight-ensnares-missouri-farm-town>
- ²⁰ *Monsanto v. Parr*, 545 F. Supp. 2d 836 (N.D. Ind. 2008), 4.
- ²¹ Barlett and Steele, “Monsanto’s Harvest of Fear.”
- ²² Center for Food Safety, *Monsanto vs. U.S. Farmers 2012 Update* (2012). <http://www.centerforfoodsafety.org/wp-content/uploads/2012/11/Monsanto-v-US-Farmer-2012-Update-final.pdf>
- ²³ *Ibid.*
- ²⁴ *Ibid.*
- ²⁵ *Monsanto Company and Delta and Pine Land Company v. Dallas Thomason, David. D. Thomason and Lucknow, Inc et al.*, (U.S. Court of Appeals for the Federal Circuit, January 22, 2002).
- ²⁶ *Monsanto Co. v. McFarling*, 2005 WL 1490051, *5 (E.D. Mo. 2005).
- ²⁷ Chris Clayton, “Bean Detective Visits Nebraskan,” *Omaha World Herald*,

CHAPTER THREE continued

November 5, 2004. <http://www.gmwatch.org/latest-listing/1-news-items/645-canadas-1st-gm-free-zone-honoured-bean-detectives-visit-nebraskan-10112004>

²⁸ Center for Food Safety, *Monsanto vs. Farmers 2012 Update*, App. II. In a series of ten state/regional updates involving nineteen states, Monsanto provided color-coded maps illustrating the number of “seed piracy matters” by county and the “average settlement” for the given state/region. All cases reported involved Roundup Ready soybeans. The documents covered Illinois, Indiana, Iowa, Kentucky, Michigan-Ohio, Minnesota-North Dakota-South Dakota, Missouri-Kansas, Nebraska, North Carolina-South Carolina, and Virginia-Maryland-Delaware-New Jersey-Pennsylvania. The documents are included as Appendix II of the *Monsanto vs. U.S. Farmers Update*.

²⁹ *Ibid*, App. I. Appendix I is a collation of the data. In Monsanto’s “seed piracy” updates, each county is color-coded for a range of seed piracy matters (1–3, 4–7, 8–13, 14–23, or 24–36). Adding the lower and upper-bound figures for each county provides the minimum and maximum number of seed piracy matters, respectively, for the given state or region. Multiplication of the minimum and maximum seed piracy matters by the “average settlement” gives the minimum and maximum settlement amounts for the given state/region. Summation of these figures for all nineteen states covered provides the minimum number of settlements (2,391), maximum number of settlements (4,531), and range of settlement amounts.

³⁰ See Complaint, *Syngenta Seeds, Inc. v. Larken*, No. 4:02-cv-00575 (E.D. Ark. Sept. 16, 2002); Complaint, *Syngenta Seeds, Inc. v. Porter Seed Cleaning, Inc.*, No. 2:02-cv-00130 (E.D. Ark. Sept. 16, 2002); Complaint, *Syngenta Seeds, Inc. v. East Arkansas Grain Co.*, No. 2:02-cv-00131 (E.D. Ark. Sept. 16, 2002); Complaint, *Syngenta Seeds, Inc. v. Griffin Seed & Grain Co., Inc.*, No. 1:02-cv-00083 (E.D. Ark. Sept. 16, 2002); Complaint, *Syngenta Seeds, Inc. v. Tichnor Drier & Storage, Inc.*, No. 5:02-cv-00335 (E.D. Ark. Sept. 16, 2002); Complaint, *Syngenta Seeds, Inc. v. Delta Cotton Coop.*, No. 3:02-cv-00309 (E.D. Ark. Sept. 16, 2002); see also David Bennett, *Seed Sale Penalties Can Be Steep*, *Delta Farm Press*, Oct. 22, 2003, <http://deltafarmpress.com/seed-sale-penalties-can-be-steep>

³¹ See, e.g., Complaint, *Syngenta Seeds, Inc. v. East Arkansas Grain Co.*, No. 2:02-cv-00131 (E.D. Ark. Sept. 16, 2002).

³² Consent Judgment, *Syngenta Seeds, Inc. v. Larken*, No. 4:02-cv-00575 (E.D. Ark. Oct. 2, 2003)

³³ Order, *Syngenta Seeds, Inc. v. Porter Seed Cleaning, Inc.*, No. 2:02-cv-00130 (E.D. Ark. Oct. 6, 2004); Order of Dismissal, *Syngenta Seeds, Inc. v. Porter Seed Cleaning, Inc.*, No. 2:02-cv-00130 (E.D. Ark. Dec. 28, 2004).

³⁴ Default Judgment, *Syngenta Seeds, Inc. v. East Arkansas Grain Co.*, No. 2:02-cv-00131 (E.D. Ark. Jan. 21, 2003); Order Dismissing Action by Reason of Settlement, *Syngenta Seeds, Inc. v. East Arkansas Grain Co.*, No. 2:02-cv-00131 (E.D. Ark. Apr. 15, 2003).

³⁵ Judgment on Jury Verdict, *Syngenta Seeds, Inc. v. Delta Cotton Coop.*, No. 3:02-cv-00309 (E.D. Ark. Apr. 28, 2005).

³⁶ Order, *Syngenta Seeds, Inc. v. Delta Cotton Coop.*, No. 3:02-cv-00309 (E.D. Ark. July 5, 2005).

³⁷ *Syngenta Seeds, Inc. v. Delta Cotton Coop.*, 457 F.3d 1269 (Fed. Cir. 2006), *reh’g denied by Syngenta Seeds, Inc. v. Delta Cotton Coop.*, No. 05-1507, 2006 U.S. App. LEXIS 25265 (Fed. Cir. Sept. 25, 2006).

³⁸ *Syngenta Seeds, Inc. v. Delta Cotton Coop.*, No. 3:02-cv-00309, 2007 U.S. Dist. LEXIS 98025 (E.D. Ark. Apr. 12, 2007).

³⁹ Complaint, *Pioneer Hi-Bred Int’l, Inc. v. Flesner*, No. 3:05-cv-03258 (C.D. Ill. Oct. 7, 2005).

⁴⁰ Consent Decree, *Pioneer Hi-Bred Int’l, Inc. v. Flesner*, No. 3:05-cv-03258 (C.D. Ill. Jan. 17, 2007).

⁴¹ Complaint, *Pioneer Hi-Bred Int’l, Inc. v. Fischer*, No. 4:05-cv-01202 (W.D. Mo. Dec. 1, 2005); Notice of Dismissal, *Pioneer Hi-Bred Int’l, Inc. v. Fischer*, No. 4:05-cv-01202 (W.D. Mo. Mar. 31, 2006).

⁴² Complaint, *Pioneer Hi-Bred Int’l, Inc. v. Nelson*, No. 1:09-cv-01246 (C.D. Ill. July 17, 2009).

⁴³ Consent Decree, *Pioneer Hi-Bred Int’l, Inc. v. Nelson*, No. 1:09-cv-01246 (C.D. Ill. Oct. 21, 2009).

⁴⁴ Complaint, *Pioneer Hi-Bred Int’l, Inc. v. Does 1-5*, No. 5:12-cv-06046 (W.D. Mo. May 11, 2012).

⁴⁵ Notice of Dismissal, *Pioneer Hi-Bred Int’l, Inc. v. Does 1-5*, No. 5:12-cv-06046 (W.D. Mo. July 19, 2012).

⁴⁶ Complaint, *BASF Agrochem. Prods. v. McKinley*, No. 5:04-cv-0412 (E.D. Ark. Nov. 22, 2004).

⁴⁷ Consent Judgment, *BASF Agrochem. Prods. v. McKinley*, No. 5:04-cv-0412 (E.D. Ark. June 30, 2005).

⁴⁸ Consent Judgment, *BASF Agrochem. Prods. v. Arnold*, No. 3:04-cv-00311 (E.D. Ark. May 16, 2005).

CHAPTER FOUR

¹ Ensuring protection of farmers from patent prosecution would also require that any amending of the Patent Act include the provision that the patenting of plant genes does not extend to patent protection for the seeds or plants that contain those genes. See *Schmeiser v. Monsanto*, No. 29437, (Can. Sup. Ct. May 21, 2004).

² Such an exemption has already been granted for certain recombinant DNA inventions. See 35 U.S.C. § 271(e)(1).

³ *SmithKline Beecham Corp.*, 365 F.3d at 1331.

⁴ Monsanto Co., *2013 Technology Use Guide*, 8-9. <http://www.genuity.com/stewardship/Documents/TUG.pdf>

⁵ Ind. Code §§ 15-15-6-11 (2003); Cal. Food & Agric. Code § 52305 (2008); Me. Rev. Stat. Ann. tit. 7, § 1053 (2007).

⁶ Cal. Food & Agric. Code § 52305 (2008); Ind. Code §§ 15-15-6-11, 15-15-7-1 through 15-15-7-12 (2003); Me. Rev. Stat. Ann. tit. 7, § 1053 (2007); N.D. Cent. Code § 4-24-13 (2001); S.D. Codified Laws §§ 38-1-44 through 38-1-50 (2002).

⁷ Ind. Code §§ 15-4-13-11 (2003).

⁸ N.D. Cent. Code § 4-24-13 (2001)(2)(a)(3). California and South Dakota also require the written permission of the farmer.

⁹ The seed supplier must give notice to the farmer and the state seed commissioner at least five business days in advance that the seed supplier intends to enter the property. This notice must include the date and time of the intended entry, as well as the purpose for the entry. The seed supplier must allow the farmer, the seed commissioner, or their agents to accompany the seed supplier when samples are taken. The seed supplier must allow the farmer, the seed commissioner, or their agents to take matching samples of any samples taken by the seed supplier.

¹⁰ Me. Rev. Stat. Ann. tit. 7, § 1053(2).

¹¹ Santa Cruz County, Cal., Code of Ordinances, tit. 7, ch. 7.31 (2006); Mendocino County, Cal., Code of Ordinances, tit. 10A, ch. 10A-15 (2004); Marin County, Cal., Code of Ordinances, tit. 6, ch. 6.92 (2004); Trinity County, Cal., Code of Ordinances, tit. 8, ch. 8.25, art. 1 (2004); City of Santa Cruz, Cal., Municipal Code, tit. 6, ch. 6-10 (2006); Hawai’i County, Haw., County Code, ch. 14, art. 15 (2008); Maui County, Haw., Code of Ordinances, tit. 20, ch. 20.38 (2009); San Juan County, Wash., Initiative Measure 2012-4, Ordinance Concerning Prohibitions on the Growing of Genetically Modified Organisms (adopted Nov. 2012); Town of Montville, Me., Genetically Modified Organisms Ordinance (adopted Mar. 29, 2008).

¹² See Benton County, Or., A Food Bill of Rights (proposed Jan. 2013); Jackson County, Or., Measure





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