

## Save Our Seeds (SOS)

A program of the  
Center for Food Safety

Debbie Barker

International Program  
Director

August 2012

Contributions, Editing  
and Research:

George Kimbrell,  
Senior Attorney

Bill Freese,  
Science Policy Analyst

Sharon Perrone,  
Research Intern

Abigail Seiler,  
Research Intern

# History of Seed in the U.S. *The Untold American Revolution*



An exhibition at the National Archives in Washington, D.C., *What's Cooking Uncle Sam?*, traces the history of U.S. agriculture from “the horse and plow to today's mechanized farm.” While the exhibition contains humorous elements, including a corporate campaign to win the War Food Administration's endorsement of its Vitamin Donuts—“For pep and vigor... Vitamin Donuts!”—it also chronicles a sobering story of American farming and how the effects of U.S. food and agricultural policies reach far beyond the borders of Uncle Sam. Throughout, it is clear that the path of agriculture begins with the seed.

Over the past 40 years, the U.S. has led a radical shift toward commercialization, consolidation, and control of seed. Prior to the advent of industrial agriculture, there were thousands of seed companies and public breeding institutions. At present, the top 10 seed and chemical companies, with the majority stake owned by U.S. corporations, control 73 percent of the global market.<sup>1</sup>

Today, fewer than 2 percent of Americans are farmers,<sup>2</sup> whereas 90 percent of our citizens lived on farms in 1810.<sup>3</sup> This represents perhaps a more transformative revolution than even the Revolutionary War recorded in our history books.

This report will provide a summary of U.S. seed policy history in order to establish the trajectory to present-day policies that threaten seed sovereignty for farmers and citizens as well as natural resources, wildlife, and food safety. As an early adopter of industrial seed development, including genetically engineered (GE) seed, and a forerunner in developing intellectual property rights (IPRs) for seed ownership, the historical narrative of the U.S. may serve as a resource for other countries to investigate.

Following the short historical narrative, main topics discussed will include the current draft of the U.S. Farm Bill; existing legal challenges pertaining to seeds; the economic realities for farmers; effects of climate change, especially as manifested in the current drought; and “seed piracy” lawsuits initiated by Monsanto against U.S. farmers. The report concludes by discussing the renaissance of small, independent seed companies.

## ***The Untold American Revolution***

Soon after reaching the “New World,” European settlers realized that the seed they had brought from Europe was unsuited for growing conditions in America. A vibrant trade of seed and agricultural commodities was quickly established with Native Americans, and this exchange established an important agricultural germplasm base.

Early founding fathers, notably Thomas Jefferson and George Washington, were as passionate about agriculture (and both were ardent plant breeders) as they were about governing the country. Their aspirations for the nation centered on agrarianism.

“Cultivators of the earth are the most valuable citizens. They are the most vigorous, the most independent, the most virtuous, and they are tied to their country, and wedded to its liberty and interests by the most lasting bonds,” Jefferson espoused.<sup>4</sup>

George Washington concurred: “I know of no pursuit in which more real and important services can be rendered to any country than by improving its agriculture...”<sup>5</sup> In the colonial era, the landed gentry formed “agricultural societies” that saved, cultivated, and exchanged seeds, though these were not widely distributed to the general populace.

In the early 1800s, the Secretary of the Treasury initiated a program requesting U.S. ambassadors and military officers to gather seeds and seed data from their posts around the globe. In 1839, this program became more methodical when the U.S. Patent Office established an agricultural division, which began collecting seeds and launching free seed distributions.

Established in 1862, the U.S. Department of Agriculture (USDA) devoted at least one-third of its budget to collecting and distributing seeds to farmers across the country. By the turn of the century, USDA had sent out over 1 billion packages of seed. The seed distribution program was enormously popular with farmers as public seed was free and of good quality. It also enabled farmers to conduct extensive seed breeding and provide the genetic foundations for American agriculture. Farmers developed steady genetic improvement mainly through a simple process known as phenotypic selection, in which seeds from the healthiest and most productive plants are saved and replanted the following season. Some of the most well-known farmer-bred seed varieties developed include Red Fyfe wheat, Grimm alfalfa, and Rough Purple Chili potato.

However, the nascent seed industry saw the federal programs as a barrier to potential profits and formed the American Seed Trade Association (ASTA) in 1883 to advocate for the end of government seed distribution. After forty years of intense lobbying by the Association, Congress eliminated the USDA seed distribution program in 1924.

## ***Land Grant Colleges and Extension Services***

Concurrent to government seed programs, legislation was passed to provide publicly funded resources for both institutions of higher learning devoted to agriculture as well as experimental and research services for rural communities. The Morrill Land Grant College Act of 1862, established by President Lincoln, provided public lands to U.S. states and territories to create colleges specializing in agricultural research and instruction. Some of today’s top universities such as Michigan State and Cornell originated because of this Act.

The Hatch Act of 1887 supplemented the land-grant system by funding experimental stations. The Hatch Act stipulated that all research must be freely shared among the institutions and also made available to farmers. The Smith-Lever Act of 1914 established cooperative extension services to provide “useful and practical information on subjects relating to agriculture...”

Together, these Acts were intended to foster universities and institutions to improve agriculture, in part by breeding new, regionally adapted plant varieties. Publicly funded plant breeders at the USDA and land grant universities pioneered breakthrough technologies in plant improvement, including backcrossing and hybridization. Throughout most of the 20<sup>th</sup> century, publicly funded breeding programs provided farmers with steadily improving, high quality seed. For example, in 1980, 70 percent of soybeans and 72-85 percent of wheat by crop acreage was planted with public sector seed.<sup>6</sup>

## *The Role of the Private Seed Sector*

Until recently, private seed firms acted mainly as distributors of publicly developed seed varieties. Most of the private seed distributors were family-owned, small or regional businesses scattered throughout the country. The private sector played a more active breeding role only in developing hybridized crops such as corn, sorghum, and sunflower. Private firms concentrated on hybrid seed because selected traits do not breed true with each successive planting, resulting in weakened traits. With the advent of hybrid seed, farmers were required, for the first time, to purchase seed annually to ensure effective desirable traits.

The development of hybrid crops, such as hybrid varieties of corn introduced in the 1930s, was instrumental to the growth of a private, commercial seed industry. Hybrid seeds were effectively a biological strategy for seed companies to expand their market influence. Instead of on-farm seed saving, farmer seed breeding, and public research and distribution, hybrid seeds gave seed companies new opportunities to explore—and too often exploit—farmer dependency on purchased seed. As these companies expanded and gained more relevance in a shifting agricultural landscape, a new era of consolidation in the seed industry began.

The emergence of agricultural biotechnology, specifically GE seeds, in the 1990s intensified consolidation and solidified an increasing trend of seed and chemical company mergers. Thus, commercial agriculture today is often referred to as the agrichemical-seed industry. For example, nearly all GE seeds today are sold by Monsanto and are resistant to a single herbicide, glyphosate. These herbicide-resistant seeds and glyphosate—marketed as Roundup Ready by Monsanto—are sold together as a highly profitable, packaged system.

*“Cultivators of the earth are the most valuable citizens. They are the most vigorous, the most independent, the most virtuous, and they are tied to their country, and wedded to its liberty and interests by the most lasting bonds.”*

— Thomas Jefferson

The advent of GE seeds has also led to increased pressure by agrichemical-seed companies to establish legal and policy mechanisms to further strengthen seed patents and IPR schemes. Thus, the emergence of two trends developed symbiotically: the advent of GE seeds and the dramatic rise in seed and plant patents leading to the consolidation of seed ownership. Genetically engineered seed patents are now a central mechanism by which to gain control and ownership of genetic material of seeds writ large.

## *Legal Origins of the Right to Own Seed*

Legal and policy strategies establishing IPRs and patent regimes of exclusivity also provided for market dominance by a handful of seed and chemical companies. The legal origins of private seed patents began with the Plant Patent Act (PPA) of 1930. This Act allowed patents for unique plant varieties of only non-sexually reproduced plants. It is significant that when Congress passed the PPA, it explicitly did not allow a patent right to plants propagated by seeds (that is, by sexual reproduction). The law stated, “To these ends the bill provides that any person who invents or discovers a new and distinct variety of plant shall be given by patent an exclusive right to propagate that plant by asexual reproduction; that is, by grafting, budding, cuttings, layering, division, and the like, but not by seeds.”<sup>7</sup>

Over the following decades, Congress consistently denied the right to grant patents to plants reproduced by seeds. In 1968, a proposed amendment to the PPA that would have extended patents to include sexually reproduced plants was defeated in Congress. During this period, the USDA opposed granting patents to sexually reproducing plants, arguing that patents 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 biodiversity. A 1983 study by the Rural Advancement Foundation International (RAFI) revealed that over the course of eighty years, the U.S. lost 93 percent of its agricultural genetic diversity.<sup>8</sup> RAFI’s report concludes that 75 percent of today’s food calories worldwide are derived from just nine plants.<sup>9</sup>

Under increasing pressure from commercial seed and chemical companies, including the ASTA, Congress passed the Plant Variety Protection Act (PVPA) in 1970. The Act authorized the USDA to grant Certificates of Protection for novel, sexually-reproducing plant varieties. The Certificates granted exclusive rights to multiply and market these seed varieties for an 18-year term. However, two important exemptions were established: 1) researchers must be allowed to use the PVPA-protected varieties to breed still better varieties, and 2) farmers must be allowed to save patented seed for re-planting.

*Diamond v. Chakrabarty*, a landmark Supreme Court case in 1980 granted the first patent on life, a decision that galvanized a great leap forward toward establishing full patent protection for sexually reproduced seed varieties. In a 5-4 decision, the Supreme Court ruled that living organisms—in this case, a bacterium—could be patented.

Shortly after this ruling, seed corporations stampeded the U.S. Patent and Trademark Office (PTO) with over 1,800 patent submissions for genetic material of seeds and plants.<sup>10</sup> Subsequently, the U.S. PTO began approving patent applications for sexually reproduced plants. These were classified and granted as utility patents which, unlike the PVPA Certificate, allow patent holders to exclude others from using the variety for research and agricultural purposes.

In 2001, in *J.E.M. Ag Supply v. Pioneer Hi-Bred International*, the Supreme Court upheld the U.S. PTO's practice of seed patenting by ruling that plants could be granted utility patents rather than the more limited patents, or Certificates, under the PVPA.

The industry consolidation that followed such policy changes has also led to a depletion of plant genetic resources as companies restructure and cut operating costs. As one example, Seminis Seeds, a leader in specialty crops and now a subsidiary of Monsanto, announced plans in 2000 to cut its seed stock by 2,000 varieties, or 25 percent.<sup>11</sup>

In sum, a single century's short-sighted industry consolidation and business practices have nearly eliminated thousands of years of selective and attentive seed saving for regional resilience.

### ***Effects of Current U.S. Patent System—Consolidation, Rising Costs, and Compromised Science***

Utility patents spurred a trend of seed and chemical mergers and acquisitions in the 1980s that continues to the present. Monsanto, DuPont, Syngenta, and Bayer controlled 49 percent of the world's proprietary seed supply as of 2007.<sup>12</sup> As a direct consequence of consolidation, the existence of small, independent seed companies rapidly declined. In 1996, there were 300 independent seed companies in the U.S.; by 2009, there were fewer than 100.<sup>13</sup>

Beyond the loss of small distributors, increased market concentration has also resulted in a dramatic increase in seed prices. Since the advent of GE seed, per acre soybean seed costs have risen an astounding 325 percent.<sup>14</sup> In addition, the "technology fee" that companies now routinely charge has significantly increased. For example, the price of a bag of soybean seed increased from \$4.50 in 1996 to an estimated \$17.50 by 2008 due to Monsanto's Roundup Ready trait technology fee.<sup>15</sup>

Restricting and influencing independent scientific research is yet another result of consolidation of the seed and chemical industry. Many believe that the legacy of the land grant universities and research institutes initiated during America's development has now become tainted as these institutions too often function as handmaidens of agribusinesses. Seed and chemical companies now partner with these public institutions by providing funding and sometimes personnel. The seed industry represents this as a win-win—it provides additional resources to these institutions and, in turn, the research benefits the public. Yet, the companies seem to derive the largest piece of the proverbial American Pie as they use the technology and research, much of it paid for by U.S. citizen tax dollars, to generate private profits.

Perhaps a more subtle, yet profound consequence of these public-private “partnerships” is that the scope of science and research can be altered. An increasing trend in universities is to focus on devising new technologies that are then appropriated by private companies for private profit. In other words, the direction of research and science in public educational bodies is more and more determined by private company agendas. Corporations provide funds mainly for quick results from technological research—such as biotechnology or nanotechnology—while long-term studies in disciplines such as biology receive little funding in comparison. It is perhaps then unsurprising that often biological consequences of the technologies developed, such as weed resistance and adverse effects on endangered species, are not addressed.

In addition to influencing the direction of science and research, public-private collaborations potentially threaten the independence, objectivity, and credibility of educational institutions. For example, Pioneer Hi-Bred prohibited university researchers from publishing their data on the mortality rates of lady beetles that had fed on an experimental variety of Pioneer GE corn (a nearly 100 percent mortality was found). Subsequently, Pioneer hired other researchers to produce more acceptable data.<sup>16</sup>

In sum, as noted by Bill Freese, science advisor of the Center for Food Safety, “The ability to obtain utility patents on plants has been a major factor in: consolidation of the seed industry; rising seed prices; a decline in seed-saving; reduced innovation; a narrowing of seed choices for farmers; and restrictions on independent scientific research.”<sup>17</sup>

### ***Current State of Play—Legal Challenges***

U.S. civil society has initiated its own legal challenges in response to seed industry practices. Most legal challenges in the U.S. are focused on GE seeds given that patents for this technology serve as the primary gateway to seed ownership and monopolies. During the last five to ten years, litigation challenging commercial approval of GE crops has been somewhat successful. Much of the litigation has centered on the USDA’s lack of meaningful analysis of the adverse environmental and economic impacts of GE crops in determining either approval of crops for testing or for commercialization. As a result of civil society’s successful legal challenges, U.S. courts now must recognize as legal harms the numerous adverse impacts of GE crops, such as transgenic contamination of natural crops and wild plants.

For example, legal challenges brought forth by farmer, consumer, and public interest environmental advocacy groups on GE biopharmaceutical crops, GE bentgrass, GE alfalfa, and GE sugar beets have successfully established that the USDA must undertake meaningful, rigorous risk analyses, such as analyzing the risk of contamination when considering approvals or testing of GE organisms. These lawsuits established “standing” for farmers and environmental advocates to seek compensation or relief in U.S. courts for the harms of GE crops, as well as be granted various forms of equitable relief (e.g., compensation) based on violations of the law.

In response, agribusiness has pumped up its volume of legal and political engagement. Millions of dollars spent in lobbying and the now well-entrenched “revolving door” syndrome seems to be paying off in terms of ensuring seed monopolies. Government agencies hire industry representatives from agribusiness and biotech firms while, in turn, these corporations recruit staff from government agencies. Numerous scientists, lawyers, and other professionals move seamlessly between employment at agribusiness/biotech companies and government agencies, compromising the regulatory system and undermining the efforts of civil society groups.

On the direct lobbying front, food and agricultural biotechnology firms spent more than \$547 million lobbying Congress between 1999 and 2009, rising from \$35 million in 1999 to \$71 million in 2009—an increase of 102.8 percent. In 2010 alone, ag-biotech companies contracted over 100 lobbying firms in addition to employing in-house lobbyists. Additionally, millions have been spent to fund political campaigns. In 1999, more than \$22 million was contributed by biotechnology corporations via Political Action Committees, or PACs.<sup>18</sup>

Such influence seems to have swayed recent policy decisions within the U.S. government, often circumventing or contravening prior court decisions. For example, in early 2011, the USDA approved unrestricted, nationwide commercial planting of Monsanto's GE alfalfa even though its own analyses and conclusions demonstrated that the approval would cause significant harm to organic and conventional alfalfa farmers and dairies as well as exporters. This decision is now under court challenge by civil society groups.

### ***Major Legal Challenges By Civil Society***

#### Challenge of GE alfalfa, GE sugar beets and other crops

In the last half dozen years, the Center for Food Safety (CFS) and represented interested parties have brought a string of lawsuits successfully challenging USDA actions related to GE crops. One case regarding USDA's first approval of GE alfalfa went all the way to the U.S. Supreme Court in 2010. This was the first time that the highest U.S. court had ever heard a case regarding GE crops. To date, CFS's legal successes have established that proper GE crop reviews must consider the risk of transgenic contamination through cross-pollination and other means; increased herbicide use and herbicide-resistant weeds; the economic impacts of adoption on non-GE, organic farmers and businesses; and the potential loss of choice for farmers and consumers wishing to purchase non-GE foods. As noted above, the cases also established that farmers and consumers could seek recourse in U.S. courts for these harms. CFS litigation continues regarding numerous crops and is in various stages of litigation.

#### Challenge of *OSGATA et al. v. Monsanto Co.*

Another current U.S. legal challenge awaiting further action is a patent challenge filed by seventy-five family farmers, seed businesses, and agricultural organizations representing over 300,000 individuals and 4,500 farms seeking a court decision to bar Monsanto from suing them for patent infringement if they became contaminated by Monsanto's GE, "Roundup Ready" seed. A district court dismissed the case in February 2012, and a decision is now on appeal.

#### Challenge of *Bowman v. Monsanto Co.*

A little known case testing the scope of biotech company seed patents is under consideration to be heard by the U.S. Supreme Court. Farmer Vernon Bowman purchased seeds from a grain elevator for planting, some of which were Roundup Ready (GE) soybean seeds. Monsanto sued him for patent infringement. Bowman contends that the patents on the seeds expired upon sale of the second generation seeds he purchased from the grain elevator. Bowman is seeking a review of a lower court decision and invoking the doctrine of patent exhaustion. Under this doctrine, once an unrestricted, authorized sale of a patented article occurs, the patent holder's exclusive rights to control the use and sale of that article are exhausted, and the purchaser is free to use or resell that article without further restraint from patent law.

#### Challenge of *Association for Molecular Pathology, et al v. U.S. Patent and Trademark, et. al*

*Association for Molecular Pathology, et al v. U.S. Patent and Trademark, et. al*, is a lawsuit that addresses patents on breast cancer genes but it may have implications for seed patents as well. The lawsuit was filed on behalf of researchers, genetic counselors, women patients, cancer survivors, women's health groups and scientific associations opposed to patents on breast cancer genes. The lawsuit challenged the U.S. PTO as well as Myriad Genetics and the University of Utah Research Foundation, which hold patents on two genes that correlate for an increased risk of ovarian and breast cancers. The lawsuit charges that patents on genes violate the First Amendment of the U.S. Constitution and patent law because genes are "products of nature" and therefore cannot be patented.

The case is slowly making its way to the U.S. Supreme Court. On March 29, 2010, a New York District Court ruled that the patents on the genes were invalid. The U.S. Appeals Court ruled in July 2011 and again in July 2012 that the patents on the genes are valid, but the patents on the methods to compare genes for gene testing are invalid. The case is expected to go the U.S. Supreme Court. If the Supreme Court accepts the case, the earliest a decision would be issued is spring of 2013. If the U.S. Supreme Court upholds the district court ruling that the patents on the genes themselves are invalid because genes are a product of nature, it will open the way to challenging patents on seeds as they, too, are products of nature. However, this will not apply to transgenic seeds, which are not classified as "products of nature."

## *The 2012 Farm Bill and the “Monsanto Rider”*

Legal court cases remain a viable way to curb or halt GE seeds and crops, and in the process, chip away at the major means by which giant seed corporations gain ownership to seeds. However, large agribusiness is lobbying to add amendments to the U.S. 2012 Farm Bill that would effectively eradicate the current legal levers that have been successfully used to challenge commercialization and ownership of GE seeds.

Every five to seven years, agricultural policies are evaluated and reauthorized through the U.S. federal Farm Bill. The 2012 U.S. Farm Bill is currently under review and most likely will not be acted upon until after the November, 2012 presidential election. While agribusiness corporations have historically played a central role in drafting farm policy, elements of a current draft extend corporate power and influence even further. Imposing these new regulations to curb alleged over-regulation is a perversion of good governance and restricts the ability of government agencies to better ensure food safety and protect farmer livelihoods, rural communities, and natural resources.

**“In sum, the increasing and overt influence of agribusiness in federal policy making could have devastating effects for farmers and the environment and further erode the integrity of our democracy.”**

Collectively referred to as the “Monsanto riders” by civil society groups, the proposed legislation, if passed, could create serious risks for farmers, the environment, and public health by eliminating all meaningful review of the impacts of GE crops and instead “fast-tracking” their approval. (A rider is essentially an amendment attached to a Congressional bill. Riders are usually created as a tactic to pass a controversial provision that would not pass as its own bill and are often inserted into legislation in a clandestine manner and unvetted by Congressional members.)

Some of the most concerning aspects of the riders include:

- ◆ Eliminating the ability to apply U.S. environmental laws, such as the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), when reviewing GE crop approvals. The riders also eliminate the role of any U.S. agency other than USDA.

As noted above, court rulings in response to civil society’s legal challenges demonstrate that, already, USDA oversight of GE crops is lacking and approvals have failed to comply with environmental laws. Severely restricting environmental or other types of reviews would effectively eliminate avenues that have been the basis of successful legal challenges to date and would remove issues such as contamination, increased herbicide use, or herbicide-resistant weeds from future GE crop impact assessments.

- ◆ Establishing automatic default approvals of GE crops if the USDA does not approve or deny a commercial application within one year (with an optional 180-day extension).

Such an unreasonable timetable would further stifle any impetus of USDA to perform meaningful environmental, economic, and public safety studies and/or adequately review public and scientific comments submitted to the Department.

A second “backdoor” approval process exists for current applications of GE crops such as Dow’s 2,4-D corn, engineered to withstand exposure to one of the herbicides in the Vietnam-era defoliant Agent Orange. If USDA is unable to approve or deny a pending crop application within 90 days of the Farm Bill passage, the crop would automatically be available for planting and commercialization, even if required environmental reviews have not been performed.

- ◆ Allowing levels of transgenic contamination in non-GE crops and foods.

Not only does this threaten consumer choice to avoid foods with GMO ingredients, but it threatens the livelihoods of non-GE and organic farmers as their crops could be rejected both domestically and abroad if contaminated. And, given that adequate, independent research on public health effects from GE foods still have not been conducted, the health of the general public could be at risk.

In sum, the increasing and overt influence of agribusiness in federal policy making represents a trend that could have devastating effects for farmers and the environment and further erode the integrity of our democratic process.

## ***Monsanto Versus America's Farmers***

*Better Seed for a Brighter Future. If there were one word to explain what Monsanto is about, it would have to be farmers. We create the seeds, traits, and crop protection chemicals that help farmers produce more food using fewer resources.*

—*Monsanto Advertisement*

In sharp contrast to the claims of this advertisement, battling Monsanto has almost become a way of life for many U.S. farmers. Farmers are now presented with contractually binding technology agreements upon purchasing patented, mainly GE, seeds. This agreement allows Monsanto to conduct property investigations, exposes the farmer to huge financial liability, binds the farmer to Monsanto's oversight for multiple years, and includes a variety of other conditions that have effectively defined what rights a farmer does and does not have in planting, harvesting, and selling GE seed.

Monsanto's treatment of farmers is an assault on the foundations of farming practices and traditions that have endured for centuries in the U.S. and millennia around the world, including one of the oldest traditions: the right to save and replant the seeds of one's crops. Through contracts, engineering, and patents, Monsanto has eliminated farmers' right to save seed, an inalienable right since time immemorial.

As of January 13, 2010, Monsanto had filed 136 lawsuits against farmers for alleged violations of its Technology Agreement and/or its patents on GE seeds. The majority of these cases ended in recorded damages awarded to Monsanto totaling around \$23 million.<sup>19</sup>

However, these lawsuits do not record the whole story. CFS compiled information that was formerly available on Monsanto's website and arrived at estimates of sums paid to Monsanto by farmers in what the company labels "seed piracy matters." Such cases are often settled out-of-court when farmers cannot afford to pay legal fees and associated expenses. The investigation found that:

- ◆ As of June 2006, Monsanto had instituted "seed piracy matters" investigations against an estimated 2,391 to 4,531 farmers in 19 states.
- ◆ Farmers have paid Monsanto an estimated \$85.7 million to \$160.6 million in settlements.
- ◆ The number of seed piracy matters reported by Monsanto is 20 to 40 times the number of lawsuits found in public court records.<sup>20</sup>

## ***American Farmers: No Longer Living the American Dream***

Besides the harassment and persecution that many farmers have faced by Monsanto, other issues are turning the American dream into a nightmare. The state of seed and concentrated seed ownership largely parallels the plight of many U.S. farmers who are struggling to make a living as farm inputs such as seeds, fertilizers, fuel, and pesticides steadily rise.

Headlines earlier in 2012 touted happy days for U.S. farmers due to increased trade and high prices paid for agricultural commodities, yet most family farmers have not benefited as potential profits dissolve because of rising on-farm expenses and fewer or lower government payments. In addition, due to the economic recession, off-farm income has fallen. For example, in 2009, real household income for family and small farms fell by 28 percent compared to 2007 levels, according to Timothy Wise, director of the Research and Policy Program at the Global Development and Environment Institute at Tufts University.<sup>21</sup>



Total farm expenditures in 2011 were \$318.7 billion—averaging 11.3 percent greater than in 2010. In particular, the price of seeds has contributed to the high cost of farm inputs.<sup>22</sup> From 2001-2010, USDA's data reveals that corn seed and soybean prices rose 135 percent and 108 percent respectively.<sup>23</sup>

Such pricing spikes generated an antitrust investigation of the seed industry by the Department of Justice in 2009, with a focus on Monsanto because it controls most of the market. (At the time of this writing, the investigation is still ongoing.) According to the Rodale Institute, at least one of Monsanto's patented genes exists in 90 percent of soy and 80 percent of corn planted in the U.S.<sup>24</sup> With many farmers struggling, Monsanto's net income increased 77 percent in 2011, coinciding with a sharp spike in seed prices, with GE corn seed increasing 32 percent and GE soybean seeds rising by 24 percent.<sup>25</sup>

Not having conventional, non-GE seed available appears to be part of the strategy to boost sales of higher-cost GE seeds. As Indiana soybean farmer Troy Roush noted, "You can't even purchase them in this market. They're not available." A farmer from Arkansas concurs: "It's getting harder and harder to find conventional [soybean] seed." A Texas cotton farmer similarly reports: "Just about the only cottonseed you can get these days is [genetically engineered]. Same thing with the corn varieties. There's not too many seeds available that are not genetically altered in some way."<sup>26</sup>

Another strategy to boost sales of GE seed involves promotion of a seed's chemical partner, such as Roundup, which contains the active ingredient glyphosate, the primary herbicide used on GE crops. In July 2011, the *Wall Street Journal* reported that the U.S. Securities and Exchange Commission issued a subpoena to Monsanto to provide documents related to its customer incentive programs for Roundup in fiscal years 2009 and 2010.<sup>27</sup> The investigation is ongoing at the time of this writing, but could reveal that Monsanto engaged in illegal practices aimed to squeeze out competitors and manipulate the market.

In the face of rising costs, many farmers have looked to obtain farm credit, long the backbone of American agriculture. However, family farmers face significant barriers to accessing farm credit. A national survey conducted by farm advocacy organizations reveal that since 2009, farmers are increasingly being denied loans due to the recent contraction of credit markets, particularly financial stress on agricultural banks and an upturn in farmer loan defaults.<sup>28</sup>

The difficulty of getting loans and farm credit is also affecting the future of farming in America. The price of land, water, and ever increasing agricultural inputs puts farming out of reach for many, notably younger generation farmers. For example, there were nearly 180,000 farmers younger than 35 in 1997. By 2007, there were only 120,000 – a decrease of one-third. The high cost of farming was the major reason credited for this decline.<sup>29</sup>

"The state of seed and concentrated seed ownership largely parallels the plight of many U.S. farmers who are struggling to make a living as farm inputs such as seeds, fertilizers, fuel, and pesticides steadily rise."

### ***Super Weeds, Super Problem***

High priced seeds are creating high stakes problems. Agronomists around the world are alarmed by the growing epidemic of weeds, or "super weeds," that have evolved resistance to glyphosate as a result of the intensive use on GE crops.<sup>30</sup> As of June 2012, over 16.7 million acres have been infested across the country.<sup>31</sup> Some estimate that this figure could more accurately be 30-40 million acres if all of the infestations were reported.<sup>32</sup>

Eliminating super weeds is an additional cost for farmers. Farmers resort to more soil-eroding tillage operations to combat these weeds and also turn to increasingly toxic herbicide cocktails. As a result, pesticide usage has massively increased in the U.S. since the adoption of GE seeds. The most comprehensive independent study to date, based on USDA data, found that GE crops used upward of 26 percent more pesticides per acre than non-GE, conventional crops.<sup>33</sup>

“Agronomists around the world are alarmed by the growing epidemic of weeds, or “super weeds,” that have evolved resistance to glyphosate as a result of the intensive use on GE crops.”

In response to increasing weed resistance to glyphosate, seed and chemical companies are developing new GE crops resistant to more toxic herbicides. Dow AgroSciences is awaiting USDA approval of corn and soybeans resistant to 2,4-D, an active ingredient in Agent Orange, which is often highly contaminated with carcinogenic dioxins. Likewise, Monsanto is planning to introduce dicamba-resistant soybeans, corn, and cotton. Dicamba has been linked to increased rates of non-Hodgkin’s lymphoma,<sup>34</sup> as well as colon and lung cancer.<sup>35</sup>

### *Drought—Crisis in America’s Heartland*

More than two-thirds of the contiguous United States was under some level of drought as of July 31, 2012; more than one-quarter of affected regions are classified as being in extreme drought or worse, according to the *Drought Monitor*, a weekly report compiled by U.S. climate experts. Some degree of dryness affects over 79 percent of the contiguous 48 states.<sup>36</sup> Government records show that 2012 has been the hottest year on record in the lower 48 states.<sup>37</sup>

Nearly 40 million out of 96 million planted U.S. acres of corn are in drought conditions.<sup>38</sup> The primary corn and soybean agricultural areas in the U.S. had their sixth-driest April-July growing season since 1895, according to the National Oceanic and Atmospheric Administration.<sup>39</sup>

In addition, 37 percent of the main livestock-producing area in the U.S. is now experiencing severe drought levels. Farmers and ranchers are finding it difficult to find feed for their livestock. According to Mark Svoboda of the National Drought Mitigation Center in Lincoln, Nebraska, “This is something that we haven’t seen, save for a couple of times, in the last hundred years.”<sup>40</sup>

The impact of widespread drought on farmers is devastating. Yet, they have been left high and dry as Congress adjourned for the summer without passing a comprehensive, adequate relief package for farmers and ranchers. The National Voluntary Organizations Active in Disaster (VOAD) predicts that the financial impacts of the 2012 drought will surpass even those of the 1988 drought, which totaled 77 billion dollars in losses due to crops, landscape, and other damages.<sup>42</sup>

Analysts also predict that low yields of corn and soy will increase food prices not only across the nation, but worldwide. Weather and drought were a partial factor in the 2007/2008 food crisis that sparked riots in Egypt, Cameroon, Haiti, and several other countries. The Food and Agriculture Organization (FAO) recently released figures showing that the world food index has increased to 6 percent.<sup>41</sup> “There is potential for a situation to develop like we had back in 2007/08,” noted FAO’s senior economist and grain analyst Abdolreza Abbassian.<sup>43</sup>

### *Climate Change—A Permanent Trend?*

While most experts agree that La Niña was a major factor behind this year’s U.S. drought, scientists also note that droughts may increase in frequency and intensity as anthropomorphic activities increase global temperatures. For example, high temperatures this year in the U.S. are part of an overall global warming trend predicted by the Intergovernmental Panel on Climate Change (IPCC). The extra heat means less snowpack to provide spring waters and parched soils combined with high water evaporation.

## Seeds of Hope—Emerging Independent Seed Companies

By Sharon Perrone

Climate models tend to concur that the intensity and frequency of droughts will increase in central North America, though there is uncertainty about which specific regions will be most affected. A 2011 report by the National Center on Atmospheric Research establishes that if the world keeps heating up, regions in North America will experience warmer air, leading to increased evaporation that will dry out soils, and persistent droughts will be more likely in the next 20 to 50 years,<sup>44</sup> possibly leading to Dust Bowl conditions, or worse.<sup>45</sup>

In times of ever increasing extreme weather associated with global warming, seed diversity is critical for agricultural production and indeed global food security. Building and maintaining seed diversity provides the very resilience and adaptation needed in times of climate chaos. Instead of continuing current policies that encourage consolidation of seed ownership and uniformity of seed, societies should build dynamic farming systems and diverse seed repositories.

### Back to the Future

Given that the majority of Americans no longer have any connection to farming, the numerous difficulties faced by farmers—notably smaller, family farms—and economic hardships of many rural communities, it appears that the U.S. has faltered in fulfilling the aspirations of our founding fathers and our agrarian inheritance. It may be time to go back to the future so there can *be* a future for farming in the U.S. The ideals of agrarian potential are astutely described by Thomas Jefferson in a letter to George Washington (1787): *Agriculture is our wisest pursuit, because it will in the end contribute most to real wealth, good morals, and happiness.*

“It may be time to go back to the future so there can *be* a future for farming in the U.S.”



Despite dismal environmental outlooks and industry's best efforts to dominate the American seed supply, farmers across the country are reclaiming their fundamental right to cultivate, breed, and distribute seed in an ecologically sustainable manner. Independent seed companies have begun to emerge to meet an increasing demand for organic seeds as the organic market in general is the fastest growing sector of U.S. agriculture. Furthermore, with growing consumer interest in organic and sustainably cultivated crops, a new market niche has opened up for enthusiastic and innovative growers to collect heirloom, organic, and open-pollinated varieties.<sup>46</sup> Frustrated and disadvantaged farmers that have been precluded from purchasing culturally significant and geographically adapted varieties due to consolidation and lack of availability are starting to turn to these local and regional growers for their seed supply.

Today, there are at least 125 independent organic seed suppliers alone across the United States.<sup>47</sup> Due to increased activism in regenerating American agriculture, these seed suppliers are rapidly acquiring unique varieties donated by small farmers and grassroots supporters around the country.

The Seed Savers Exchange based at Heritage Farm in Decorah, Iowa, is a prime example. Diane Ott Whealy founded the farm in 1975 when her grandfather gave her two plants brought from Bavaria in the late 1800s. Today, Heritage Farm keeps over 25,000 varieties.<sup>48</sup> Similarly, the Baker Creek Heirloom Seed Company in Mansfield, Missouri, cultivates and sells over 1400 unique cultivars from 70 countries.<sup>49</sup>

Such encouraging examples provide inspiration for an increasing trend towards reliance on local, resilient, and biodiverse crops to sustain a new era of post-industrial agriculture.

## Sources

- <sup>1</sup> ETC Group, *Who will control the Green Economy?* (Ottawa: ETC Group, December 2011).
- <sup>2</sup> National Institute of Food and Agriculture, USDA, "Extension," last modified April 19, 2011, <http://www.csrees.usda.gov/qlinks/extension.html>
- <sup>3</sup> John Opie, *EARLY AMERICA: 1630-1812* (Washington, DC: Environmental Literacy Council, September 2006).
- <sup>4</sup> Thomas Jefferson, *Notes on the State of Virginia* (Paris, 1785).
- <sup>5</sup> George Washington, Letter (July 20, 1794).
- <sup>6</sup> Jorge Fernandez-Cornejo, "The Seed Industry in U.S. Agriculture," *USDA Economic Research Service, Agriculture Information Bulletin* 786 (2004): Tables 17 & 21, 36 & 40.
- <sup>7</sup> Joseph Mendelson III, *Brief Amici Curiae of American Corn Growers Association and National Farmers Union in Support of the Petitioners*, (Washington, DC: Center for Food Safety, May 2001).
- <sup>8</sup> Gwen Sharp, "Loss Of Genetic Diversity In U.S. Food Crops," *The Society Pages*, July 19, 2011, accessed August 7, 2012, <http://thesocietypages.org/socimages/2011/07/19/loss-of-genetic-diversity-in-u-s-food-crops>
- <sup>9</sup> Cary Fowler and Pat Mooney, *Shattering: Food, Politics and the Loss of Genetic Diversity* (Tucson: University of Arizona Press, 1990).
- <sup>10</sup> J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred International, Inc., 122 S. Ct. 593, 596 (2001).
- <sup>11</sup> Helena Paul, et al., "Chapter 4: Consolidation, Contamination and Loss of Diversity: the Biotech Dream Takes Hold." *Hungry Corporations: Transnational Biotech Companies Colonize the Food Chain* (London: Zed Books, November 2003), <http://www.econexus.info/sites/econexus/files/ENx-HC-Ch4.pdf>
- <sup>12</sup> ETC Group, *Who will control the Green Economy?*
- <sup>13</sup> Matthew Wilde, "Independent seed companies a dying breed," *WCF Courier*, August 22, 2012, [http://wfcourier.com/business/local/article\\_7cef1f1c-b0bb-56a8-8d83-faf894bf76ad.html](http://wfcourier.com/business/local/article_7cef1f1c-b0bb-56a8-8d83-faf894bf76ad.html)
- <sup>14</sup> Data derived from figures published by USDA Economic Research Service: Commodity Costs and Returns (July 5, 2012), <http://www.ers.usda.gov/data-products/commodity-costs-and-returns.aspx>
- <sup>15</sup> Kristina Hubbard, *Out of Hand: Farmers Face the Consequences of a Consolidated Seed Industry* (Washington, DC: National Family Farm Coalition, December 2009).
- <sup>16</sup> Emily Waltz, "Under Wraps," *Nature Biotechnology* 27 no. 10 (October, 2009): 880-82.
- <sup>17</sup> Bill Freese, "Letter to David B. Verrilli, Jr. Re: Bowman v. Monsanto Co.," *U.S. Supreme Court Case No. 11-796* (Washington, DC: Center for Food Safety, August 17, 2012).
- <sup>18</sup> Food & Water Watch, *Food and Agriculture Biotechnology Industry Spends More Than Half a Billion Dollars to Influence Congress* (Washington, DC: Food & Water Watch, November 2010).
- <sup>19</sup> Center for Food Safety, *Monsanto vs. U.S. Farmers 2010 Update* (Washington, DC: Center for Food Safety, 2010), <http://www.centerforfoodsafety.org/wp-content/uploads/2012/03/Monsanto-v-US-Farmer-2010-Update-v-2.pdf>.
- <sup>20</sup> Ibid.
- <sup>21</sup> Timothy A. Wise, "Still Waiting for the Farm Boom: Family Farmers Worse Off Despite High Prices," *GDAE Policy Brief 11-01* (Medford, MA: Global Development and Environment Institute, Tufts University, March 2011). Farm Aid provided research assistance for this report.
- <sup>22</sup> U.S. Department of Agriculture, National Agricultural Statistics Service, *Farm Production Expenditures 2011 Summary* (Washington, DC: USDA, August 2012), <http://usda01.library.cornell.edu/usda/current/FarmProdEx/FarmProdEx-08-02-2012.pdf>
- <sup>23</sup> William Neuman, "Rapid Rise in Seed Prices Draws U.S. Scrutiny," *New York Times Online*, March 11, 2010, <http://www.nytimes.com/2010/03/12/business/12seed.html?pagewanted=all>
- <sup>24</sup> Emily Main, "SEC Investigates Monsanto's Shady Dealings," *Rodale* (2011), <http://www.rodale.com/monsanto-seeds>
- <sup>25</sup> "Monsanto's Shady Dealings Under Investigation by the Securities Exchange Commission." *Safe Lawns Blog*, July 16, 2011, <http://www.safelawns.org/blog/index.php/2011/07/monsantos-shady-dealings-under-investigation-by-the-securities-exchange-commission>
- <sup>26</sup> Center for Food Safety, *Monsanto vs. U.S. Farmers* (Washington, DC: Center for Food Safety, 2005), <http://www.centerforfoodsafety.org/pubs/CFSMonsantovsFarmerReport1.13.05.pdf>
- <sup>27</sup> Tom Philpott, "SEC Investigates Monsanto's Roundup Biz," *Mother Jones*, July 19, 2011, accessed August 23, 2012, <http://www.motherjones.com/tom-philpott/2011/07/roundup-sec-investigates-monsanto>
- <sup>28</sup> Farm Aid, et al., "Don't Bank On It: Farmers Face Significant Barriers to Credit Access During Economic Downturn," *Farm Aid* (March, 2011), [http://www.nfc.net/Issues/Credit%20and%20Disaster%20Work/FARMER\\_CREDIT\\_REPORT-MARCH\\_2011.pdf](http://www.nfc.net/Issues/Credit%20and%20Disaster%20Work/FARMER_CREDIT_REPORT-MARCH_2011.pdf)
- <sup>29</sup> Clay Masters, "High Costs Make It Harder To Grow Young Farmers," *National Public Radio*, September 23, 2011, <http://www.npr.org/2011/09/23/140631752/high-costs-make-it-harder-to-grow-young-farmers%20>
- <sup>30</sup> Stephen B. Powles, "Gene amplification delivers glyphosate-resistant weed evolution," *Proceedings of the National Academy of Science* 107 (2010): 955-56.
- <sup>31</sup> Bill Freese, *Comments to USDA APHIS on Environmental Assessment for the Determination of Nonregulated Status of Herbicide-Tolerant DAS-40278-9 Corn, Zea mays, Event DAS-40278-9* (Washington, DC: Center for Food Safety, April 27, 2012), <http://www.centerforfoodsafety.org/wp-content/uploads/2012/04/CFS-Science-Comments-L.pdf>
- <sup>32</sup> Ian Heap, email from Dr. Ian Heap to Charles Benbrook (August 2, 2012).
- <sup>33</sup> Charles Benbrook, *Impacts of Genetically Engineered Crops on Pesticide Use in the United States: The First Thirteen Years* (The Organic Center, November 2009): 47 & Supplemental Table 7.
- <sup>34</sup> Kenneth P. Cantor, *Pesticides and other agricultural risk factors for non-Hodgkin's lymphoma among men in Iowa and Minnesota* (Cancer Res. 1992) 52: 2447-55.
- <sup>35</sup> Claudine Samanic, et al., "Cancer Incidence Among Pesticide Applicators Exposed to Dicamba in the Agricultural Health Study," *Environmental Health Perspectives* 114 (2006): 1521-26.
- <sup>36</sup> *Drought Monitor*. (National Drought Mitigation Center, July 31, 2012), <http://droughtmonitor.unl.edu/archive.html>
- <sup>37</sup> National Climatic Data Center, *State of the Climate* (National Oceanic and Atmospheric Administration, July 2012), <http://www.ncdc.noaa.gov/sotc/>
- <sup>38</sup> Bonnie Berkowitz, "Drought intensifies in most-parched areas of U.S.," *The Washington Post*, August 3, 2012, [http://www.washingtonpost.com/national/health-science/drought-intensifies-in-most-parched-areas-of-us/2012/08/02/gJQAc334RX\\_story.html](http://www.washingtonpost.com/national/health-science/drought-intensifies-in-most-parched-areas-of-us/2012/08/02/gJQAc334RX_story.html)
- <sup>39</sup> National Climate Data Center, *State of the Climate*.
- <sup>40</sup> Brian K. Sullivan, "Worst Drought Covers Nearly One-Fourth Of Contiguous U.S.," *Bloomberg*, August 9, 2012, <http://www.bloomberg.com/news/2012-08-09/worst-drought-covers-nearly-one-fourth-of-contiguous-u-s.html>
- <sup>41</sup> Food and Agriculture Organization, "FAO Food Price Index up 6 percent," *FAO* (August 9, 2012), <http://www.fao.org/news/story/en/item/154266/jcode/>
- <sup>42</sup> National Voluntary Organizations Active in Disaster, "National VOAD Declares 2012 Drought a National Disaster - Calls for Coordinated Action," *Drought Task Force 2012*, August 10, 2012, [http://www.nvoad.org/index.php?option=com\\_content&view=article&id=150&Itemid=221](http://www.nvoad.org/index.php?option=com_content&view=article&id=150&Itemid=221)
- <sup>43</sup> Catherine Hornby and Karl Plume, "U.S. drought, food prices fan fears of new crisis," *Reuters*, August 9, 2012, <http://www.reuters.com/article/2012/08/09/drought-idUSL2E8J9C7X20120809>
- <sup>44</sup> Aiguo Dai, "Brought under global warming: a review," *Wiley Online Library*, (January/February 2011), [http://www.cgd.ucar.edu/cas/adai/papers/Dai-drought\\_WIRES2010.pdf](http://www.cgd.ucar.edu/cas/adai/papers/Dai-drought_WIRES2010.pdf)
- <sup>45</sup> Brad Plumer, "What we know about climate change and drought," *The Washington Post*, July 24, 2012, <http://www.washingtonpost.com/blogs/ezra-klein/wp/2012/07/24/what-we-know-about-climate-change-and-drought/>
- <sup>46</sup> Niels Louwaars, Philippe Le Coent and Tom Osborn, *Seed Systems and Plant Genetic Resources for Food and Agriculture* (Rome: FAO, 2011), [http://www.ipeg.eu/wp-content/uploads/Louwaars-cs\\_Seed-Systems-and-Plant-Genetic-Resources-for-Food-and-Agriculture.pdf](http://www.ipeg.eu/wp-content/uploads/Louwaars-cs_Seed-Systems-and-Plant-Genetic-Resources-for-Food-and-Agriculture.pdf)
- <sup>47</sup> Katherine L. Adam, "Directory of Organic Seed Suppliers," *National Sustainable Agriculture Information Service* (February 25, 2011), [https://attra.ncat.org/attra-pub/organic\\_seed/index.php](https://attra.ncat.org/attra-pub/organic_seed/index.php)
- <sup>48</sup> Seed Savers Exchange, "SSE Membership," *Seed Savers Exchange* (2012), <http://www.seedsavers.org/Content.aspx?src=membership.htm>
- <sup>49</sup> Baker Creek Heirloom Seed Company, "Shop Seeds," *Baker Creek Heirloom Seeds* (2012), <http://rareseeds.com/shop>