

“The greatest service which can be rendered to any country is to add a useful plant to its culture!”

SEEDS OF SUSTAINABILITY

❖ **PRESERVING THE PAST ONE PLANT AT A TIME** ❖

*by Bill McDorman
& Stephen Thomas*

Welcome to America — *beautiful America!* — albeit the America of our past. The quote above is from Thomas Jefferson, a seed-saving statesman who set the stage for agricultural leadership when he exclaimed that his proudest accomplishment was introducing *upland rice* to the nation’s farmlands. The principles of agricultural diversity and regional adaptability were once the very foundation of this country’s design — and at the root were the seeds. America’s famous land-grant universities (such as Michigan, Cornell and Iowa State) were established in 1862, in large part to help collect, breed and distribute seeds. The USDA allocated at least a third of its budget in 1878 to collect and freely distribute seeds. By 1897 the Patent and Trade Office was supplying over 1.1 billion packets of these USDA seeds to America’s farmers, a practice that continued for nearly 30 years. At the turn of the last century no one owned our seeds. They were part and parcel of the public trust. Nearly every farmer and gardener freely received, saved and shared them.

Our modern agricultural paradigm couldn't be more different. Today, seeds are private property, owned and sold by an elite group of corporate interests. Only three companies control 56 percent of the global seed market. Private companies fund most agricultural research, often with the intent to design and patent new organisms for their own gain. Rather than supplying farmers with free, locally adapted seeds, government institutions now make their alliances with the multinational corporations in control of the genetic wealth. Alarming stories of GMOs, terminator genes, doomsday seed vaults, and survival seed banks regularly garnish the headlines. In the face of this brave new world, citizens and farmers alike often react with helplessness, anger and fear.

The concern, many would say, is justified. Diversity is the foundation to the strength of any ecosystem. Once the diversity in our food crops is gone, it is lost forever. If we irreparably change or destroy the underlying source of our food system — the seeds — our society

Titus Magic Beans (left) developed by Arizona seedsman Thunderfoot, are featured in the Seeds Trust catalog.

Dan Hobbs demonstrates how to clean squash seeds on his farm in Colorado during an Organic Seed Alliance Seed Saving Workshop in September. Dan and his farm are part of the Family Farmer Seed Cooperative.



Hand melon seed cleaning screen at Hollar Seeds in Rocky Ford, Colorado.

may very well collapse, and all of our efforts to build a sustainable culture will be for naught. As an example of our current plight, 96 percent of the commercial vegetable varieties grown in 1903 are no longer available. In the view of some observers, our agricultural story is shaping up to be a Greek tragedy, acted out with hubris on a monumental new genetic scale. The President of Novartis Seeds, John Sorenson, exemplified this blind ambition during a 1999 debate with me about GMOs on Idaho Public Television. In response to my concerns over biotechnology's long-term safety, Sorenson proclaimed, "There will be no mistakes. We have the keys to the candy store. We can accomplish quickly what

we want now by splicing genes. We can feed the world.”

But the truth is, we all know there will be mistakes. This is, in fact, how nature works. The entire history of agriculture can be characterized as humankind taking advantage of the genetic “mistakes” that improved crops. But the concern lies in the quality and the consequence of the mistakes being made. In the modern corporate rush to grow large, profitable markets by engineering new life forms, we may have already released enough genetically modified material to sabotage our future food security and public health. We just don’t know the outcome yet. While genetic engineering may well play a positive role somewhere in our future, intelligence at this point dictates caution. But there is one thing we can be sure of: genetic engineering in the hands of short-sighted, profit-motivated chemical companies has not been a good idea.

MODERN SEED INDUSTRY HISTORY

The beginning of the end of public ownership of seeds came in 1883 with the formation of the American Seed Trade Association (ASTA). Recognizing an abundant, untapped market in the world’s biodiversity, the organization immediately petitioned the government to dismantle the USDA seed distribution programs. In 1924, after more than 40 years of lobbying, Congress acquiesced and cut the programs. ASTA also succeeded in convincing government that the proper role of publicly funded institutions like the land-grant universities was to train plant breeders, perform fundamental research and create raw materials and technologies for private industry to capitalize upon. Private seed companies quickly seized on this, creating proprietary varieties from the inbred lines and breeding stock developed in public universities.

The privatization of seeds has its legal origins in the Plant Patent Act of 1930. This landmark bill allowed for plants propagated through cloning to be patented and privately owned, but it specifically exempted seed-propagated crops. This wall was breached in 1970 with the Plant Variety Protection Act, which extended intellectual property rights to

plants grown from seeds. A wave of seed company mergers and buyouts followed, but a 1980 Supreme Court ruling opened the floodgates. The case of *Diamond vs. Chakrabarty* cleared the way for the patenting of life forms based on their genetic coding. Prior to this, a plant could

open-pollinated corn. Hybrid vigor was just emerging as an exciting new prospect for increasing yields, with hybrid corn quickly becoming the poster child for modern plant breeding. Reluctant to leave behind local adaptability (the goal and hallmark of agriculture up to this



Glass Gem corn developed by Greg Schoen and grown by Bill McDorman.

be owned but its genetics could not. For the first time, the genetic wisdom in a seed could be held as private property. Shortly after this ruling, more than 1,800 such patents were filed. The final nail in the coffin came in 1992 when then Vice President Dan Quayle announced the “coordinated framework” for regulatory reform of biotechnology and GMO crops. This proclamation essentially assured the biotech corporations that no new laws would be passed to regulate the emerging industry. Revealingly, the announcement came before any genetically modified crops had even been planted — the result of a preemptive, closed-door deal between government and corporate interests.

The story of the modern seed industry wouldn’t be complete without the story of hybrid crops — and the crop that started it all: hybrid corn. In 1920 America was growing more than 1,000 different varieties of locally adapted,

point), early hybrid breeders initially continued to produce crops adapted to each local area. However, as the one-size-fits-all logic of the marketplace took hold, breeders soon abandoned locally adapted varieties for those suited to broader regions. The mass adoption of hybrid seed resulted in higher production, but these gains were not without consequences. Because hybrid crops bore seed that was genetically unpredictable, farmers had to buy new seed stock every year to maintain high yields — a boon for breeders and seed companies. The rush to embrace hybrid seed would result in the disappearance of much of our regional diversity.

VERTICAL RESISTANCE

In his 1996 book *Return to Resistance*, Raoul Robison describes the crossroads moment when agriculture left the more holistic path of plant breeding and started down the road to modern gene

manipulation. Modern scientists began breeding for “vertical resistance,” seeking out the specific genes to confer quantifiable improvements for a particular problem, such as stem weakness or blight. For the previous 10,000 years, “horizontal resistance” was the breeding method used to improve crops. This technique considered the overall health and quality of a broad population of plants alongside its adaptation to regional growing conditions.

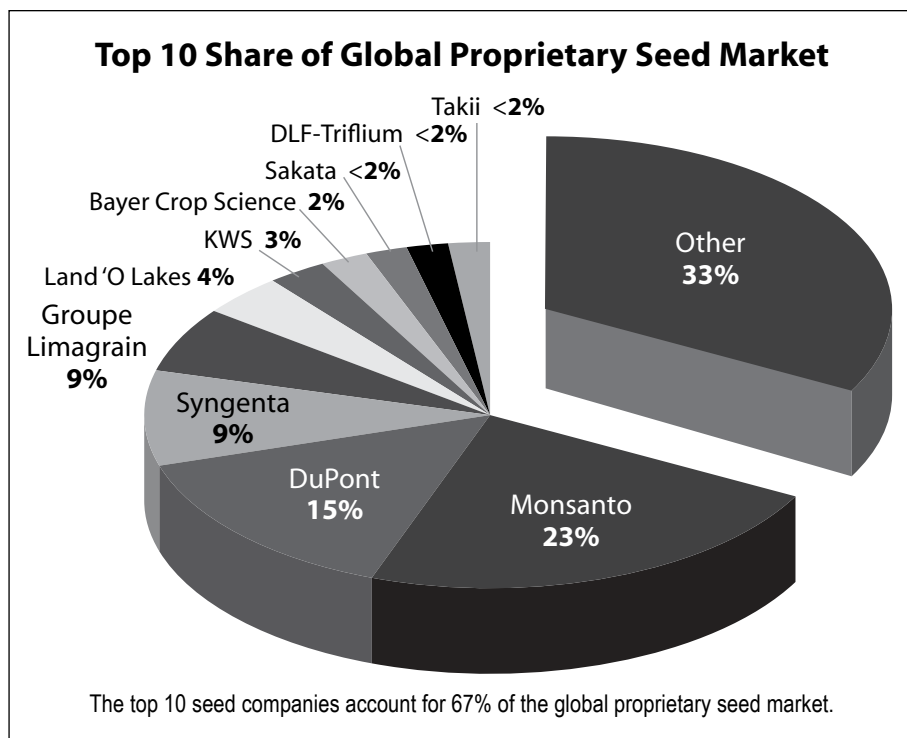
The problem with vertical resistance is pests can more easily evolve to overcome the resistance conferred by single genes. Perhaps the most famous instance of this shortfall involved Nobel [Prize] laureate Norman Borlaug’s discovery of a gene that gave wheat immunity to red stem rust. In 1998, William Wagoire, a pupil of Borlaug’s, discovered a variation of stem rust that had evolved to overcome the previously unconquered gene. According to the *Los Angeles Times*, “The [new] fungus could wipe out more than 80 percent of the world’s wheat crops as it spreads from Africa. . . . The race is on to breed resistant plants before it reaches the U.S.” This points out the importance of diversity in maintaining our food crops.

BATTLING DISAPPEARING DIVERSITY

I first heard about agriculture’s disappearing genetic diversity back in college in the late 1970s. After trying to find seeds for my own garden and having little luck, I banded together with some fellow gardeners in search of heirlooms. Our quest resulted in founding a seed company of our own — Garden City Seeds — to make these disappearing treasures readily available again. We weren’t alone in this vision. The industrialization of agriculture and the centralization of the seed industry had opened a fertile niche for small seed companies targeting a new sustainable agriculture. Except it wasn’t actually anything new, to be fair. The seed world we envisioned at the time closely resembled the world of our grandmothers and grandfathers: a vibrant web of biodiversity and resilience, with every region rich in its own varieties and adapted to its own conditions and culture.

Before long this shared vision began to blossom. In 1985 the Missouri Botanical Gardens and the National Garden Association sponsored a national conference for this emerging generation of seed people. A network of visionary, locally-minded seed businesses and organizations quickly took root across the country. Operating out of Boise, the pioneering company Seeds Blum gained national exposure selling rare heirlooms. The Iowa-based nonprofit Seed Savers Exchange formed to organize individual gardeners to save their grandparents’ seeds. Native Seeds/S.E.A.R.C.H. started up in Tucson with the mission to seek out

city. Largely under the banners of “organic” and “non-GMO,” companies like Seeds of Change, High Mowing and Baker Creek entered the seed market with eye-catching new catalogs and high standards of sustainability. By the turn of the 21st century, the Internet helped to bring down the last barriers between seed savers, growers and potential customers. A renewed era of abundance was underway as countless new seed sources cropped up online. (Several years ago a tomato grower walked into my office after searching the Internet for seeds. He had just discovered roughly 400 seed sources on the web.)



Courtesy of ETC Group, www.etcgroup.org/

and preserve the seeds from ancient cultures in the Southwest. Many of today’s best-known independent seed companies — Johnny’s Selected Seeds, Fedco, Territorial, Abundant Life, Garden City Seeds, High Altitude Gardens (another company I founded), and Southern Exposure — all rose to prominence during this time, focusing on finding and marketing seeds adapted to their own regions.

By the nineties yet another wave of new seed companies was springing up in reaction to the intensifying industrial storm and rapidly disappearing diver-

Organic agriculture had become a multi-billion dollar industry and a number of new companies rose to the challenge to supply seeds for this budding market. Outfits like Seeds of Change, Territorial and Fedco began contracting small organic farmers to grow seed crops, a practice which fueled the beginnings of a nationwide network of organic seed growers. John Navazio and the Organic Seed Alliance set up educational programs to inspire and train these new market farmers and seed growers. A number of operations like Wild Garden Seeds and Siskiyou Seeds grew and

marketed their own farm-grown seeds directly to the public. A group known as the Family Farmer Seed Cooperative took this idea one step further, organizing seed growers into regional producers and marketing co-ops. Sound familiar? We are returning full circle to the regionalism, resilience and genetic abundance at the dawn of the last century.

One complicating factor in this return to our agricultural roots is the National Organic Program. Among its many requirements, certified organic growers must buy certified organic seed, if it is available. Although welcomed for its incentives to get the poisons and chemicals out of agriculture, the long-

whether it is government-sanctioned organic. Every farmer can then easily expand diversity under the organic label in one or two seasons by organically growing and saving the seeds from as-yet uncertified crops.

We hold the keys to our own candy store. Once a farmer allows nature to act upon his crops in countless, unknowable ways, by saving the resulting seeds he begins to harness the power of nature's elegant built-in genetic feedback system. Even modern plant breeders acknowledge the advanced ability of nature to create and refine plant varieties. In the *Principles of Plant Breeding*, Robert Allard states, "In some cases it appears that

yellow dent. He repeated this process year after year, selecting seed only from those specimens with admirable qualities. Forty years later, Reid's yellow dent corn took the blue ribbon at the Illinois State Fair, and in 1893 it won the gold medal at the World's Fair. His humble corn became the most popular variety of open-pollinated corn grown worldwide during much of the 20th century. All of this success came not from a master breeder or lab geneticist but from one farmer in one field, selecting and saving the best of his seed as an investment into the next growing season.

Or how about the story of Montana gardener Dave Christensen who



Clipper seed cleaning machines at Native Seeds/S.E.A.R.C.H. designed years ago and still used today.

term effect of organic certification on the overall seed picture is a mixed bag. Organic seed is becoming just another industrial market niche. One-size-fits-all, hybrid organic seeds produced by the multinational giants are now beginning to flood the market. At this critical stage, we have lost entirely too much of the world's agricultural genetic diversity. Asking organic farmers to focus on certified organic seed is problematic (and perhaps, catastrophic) since most of the world's remaining diversity is not yet certified. We want — and greatly need — an organic agriculture, but we absolutely need the abundant diversity to sustain it. Until this genetic balance is righted, our focus should be on re-introducing new diversity regardless of

natural selection may be more discerning than farmers (or plant breeders) in identifying and preserving adaptively superior types, particularly if natural selection is allowed to operate for several to many generations in relevant environments."

Some remarkable examples of this process can be found in the colorful tales of farm lore. Take, for instance, the story of James L. Reid, an Ohio farmer who moved to the colder climes of Northern Illinois in 1847. When his favorite yellow dent corn fared poorly in the shorter season, Reid began experimenting. The following year he interplanted the rest of his dent with locally adapted Indian corn. When the harvest came, Reid saved seed from the ears that resembled his

struck out on a similar quest for a cold hardy flour corn thirty years ago. He eventually found more than 70 tough, open-pollinated varieties from Native Americans and homesteaders. None had exactly the qualities he was looking for, so he mixed them up and planted them together. Year after year, Christensen selected, saved, and replanted the best seed. And the result? Look no further than this year's Fedco catalog, which praised Christensen's Painted Mountain corn as "the hardest, fastest-maturing grain corn in the world." Again, this was the work of one farmer in one field selecting for specific characteristics. All it takes is reconnecting with the simple process of saving seed.

There's no reason for even modern, overworked farmers not to incorporate seed saving into their operations. To put it in economic terms, it is too lucrative an investment to pass up. When a farmer saves his own seeds from plants that flourish on his particular farm, he carries the best results of one growing season into the next. He is investing in his own unique interface with the environment. The investment is not merely compounded — it is exponential. And as an added bonus, it enhances the overall genetic diversity and durability of our agricultural system.

Seed saving does not have to be complicated or overwhelming. Start small. Keep it simple and have fun. Some vegetables and grains are easier to save seed from than others.

Peas, beans, tomatoes and lettuce all have self-pollinating flowers and produce seeds in the first season. They go on the *beginner's* list.

Once successful at saving seeds from the beginners, a farmer can venture into the *intermediates*: corn, cucumber, muskmelon, radish, spinach, squash and pumpkin. These vegetables are wind- and insect-pollinated and can be contaminated with pollen from unwanted sources. They will also produce seeds the same year as planted. The breeding system of each plant needs to be understood and the appropriate separation distance employed.

The *expert* vegetables include: beets, Swiss chard, broccoli, cauliflower, cabbage, kale, carrot, escarole, onion, radicchio, chicory, turnip and Chinese cabbage. They all require isolation and produce seeds in the second season after planting.

Isolation distances and other tricks for concurrently growing more than one variety in the same field can be found in most seed saving books (including my own, *Basic Seed Saving*). Carol Deppe's *Breed Your Own Backyard Garden Vegetables* also has an excellent section on selection characteristics and techniques. The tools are in your hands, and the best part is, you are in control. You get to manipulate pollination and keep the seeds for the characteristics you desire. And as Carol reminds us, even if you make mistakes, you get to eat them.

We are relearning the powerful potential of saving our own seeds. Just as the resilient and adaptive plants we tend, we are doing what we have always done best: turning crisis into opportunity. The challenges farmers face today are a clarion call to change the way they think about seeds on their farms. Fortunately, many already know how to make this kind of change. It requires the same kind of holistic and integrated thinking that ushered in the transition to organic agriculture — and like the organic movement, it has the revolutionary power to change the world as we know it.

The barriers to food security and self-reliance are imposing, corporate and international. The hegemonic seed giants have considerable sway over legislation to protect their interests and have won favor in the courts. Yet as desperate as it seems, there is still hope. We can save

our way out of this. We can save our own seeds. Ordinary farmers and gardeners created the world's abundant diversity, the fields from which agriculture first emerged. Now it is up to farmers and gardeners to save it. Our common sense interaction with our immediate environment — and the unlimited potential in each seed — offers us our best chance to survive and to thrive. It always has. One farmer, one field at a time.

Bill McDorman is President of Seeds Trust (High Altitude Gardens), founded in 1984. He has over 30 years experience in the bioregional seed business and has started three seed companies and two non-profits. He is on the board of directors of Native Seeds/S.E.A.R.C.H. and is the author of *Basic Seed Saving*.

Stephen C. Thomas is an itinerant writer originally from Atlanta. He is a contributing editor for *RealitySandwich.com*, where he covers the environment, culture and consciousness as ST Frequency.

RESOURCES

Organic Seed Alliance (OSA)

P.O. Box 772
Port Townsend, WA 98368
360-385-7192
fax: 360-385-7455
www.seedalliance.org
info@seedalliance.org

OSA provides education through publications and workshops, research through participatory plant breeding projects with farmers and consulting with direct technical assistance.

Seed School

Seeds Trust
P.O. Box 596
Cornville, AZ 86325
928-649-3315
fax: 877-686-7524
www.seedstrust.com
belle@seedstrust.com

Five-day immersions in the Verde Valley in Arizona. Seed School teaches the practical, detailed

information necessary to recreate the genetic foundation for a truly sustainable agriculture. Facilitated by Bill McDorman from Seeds Trust and guests. Five dates in 2011.

Seed Saving Books:

Principles of Plant Breeding, Robert Allard, Wiley, 2nd Edition, 1999.

Breed Your Own Vegetable Varieties, Carol Deppe, Chelsea Green, 2nd edition, 2000.

The Resilient Gardener: Food Production and Self-Reliance in Uncertain Times, Carol Deppe, Chelsea Green, 1st edition, 2010.

Seed to Seed: Seed Saving and Growing Techniques for Vegetable Gardeners, Suzanne Ashworth and Kent Whealy, Seed Savers Exchange, 2nd edition, 2002.

Basic Seed Saving, Bill McDorman, Seeds Trust, 1st edition, 1994.

Return to Resistance: Breeding Crops to Reduce Pesticide Dependence, R. Robinson, IDRC Books, 1995