Seeds of Life

Senior Project Report
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" All that is born is born of anna (food). Whatever exists on Earth is born of anna, lives on anna, and in the end merges into anna. Anna indeed is the first born amongst all beings."

Food is the basis on which all life depends. Today the way we grow and produce food is changing. We live in a time where food is processed, pasteurized and genetically modified. Rarely do we know who grew our food and where, what chemicals were added, or even who we are supporting when we purchase our goods. The food industry is part of a corporatization of food shockingly manifested in the monopolization and centralization of the seed industry. This is industry that people tend not to know very much about, but which is crucial to the future of world food security and farmers everywhere.

Today the majority of the world's population is concentrated in non-industrialized countries and seventy percent of that gross population earns a living by food production, (versus the two percent of population in industrialized countries). For centuries these Third World farmers have been successful in cultivating crops and through the process of natural selection helped develop species that are hardy and diverse. For example, Indian farmers have cultivated and developed 200,000 different varieties of rice through innovation and breeding. New Guinea has developed more than 5,000 varieties of sweet potatoes. This was made possible by the process of farmers' freely sharing seeds with each other, another tradition that goes back centuries, wherein a farmer who wanted a certain amount of a farmer's seed would ask him for it and then reciprocate by giving the farmer an equal amount of his own seed. So not only was seed shared by all, but farmers could plan what they were going to plant the next season by monitoring how seeds did in their neighbor's fields, learning from each other's mistakes and successes.

This was an extremely effective and long standing method. Unfortunately the way the seed

industry is set up today, farmers cannot continue in this time honored, sustainable way. To begin with let me tell you a little about the history of the seed industry. In 1987 The Dag Hammars Kjold Foundation organized a meeting on bio-technology called the " Laws of Life". The meeting was designed to address the emerging and prevalent issues of genetic engineering and patenting. The meeting made clear and alerted people that giant chemical companies, (such as Monsanto), were " repositioning" themselves as " life sciences" companies. Their initiative was to control the agriculture industry through patents , genetic engineering, and

mergers.

Today just ten corporations control 32 percent of the entire commercial seed industry, which is valued at an estimated twenty three billion. These same corporations own one hundred percent of the market for genetically engineered, or transgenic seeds, as well as the global agrochemical and pesticide market. The result is the monopolization of the industry which in turn lead to establishments like the World Trade Organization (WTO) and international policies, like the Trade Related Intellectual Property Rights Agreement. This agreement, through the WTO, makes it possible for a corporation to describe the genetics of the seed and monopolize it, by claiming it as private property. They are able to justify this through a process called biopiracy. This occurs when a corporation claims that they have "discovered" seeds and genetic materials that have been used by indigenous people for centuries. The result is corporate monopoly over the seed itself. This agreement also criminalizes seed-saving and seed-sharing. These laws benefit the big corporations because they work towards a mutual goal; to attain maximum profit, with no regard for small-scale farmers. Thus local markets are being deliberately destroyed and replaced by global markets in order to establish monopolies over seed and in turn food systems. (Shiva. Stolen Harvest)

From the 250,000 to 300,000 species of plants today, a minimum of 10,000 to 50,000 are edible. Around 7,000 of these are farmed and used for food. Out of these 7,000 just 30 species provide 90 percent

of the world's calorie consumption and only four species, rice, maize, wheat, and soy bean, provide the majority of calories and proteins consumed by the world's population through the global trading market. When you take into account the fact that all these crops are grown from seed and that ten corporations control one fourth of all commercial seeds and 100 percent of all genetically modified seeds, you begin to realize why the monopolization of the seed industry is such a big problem. It used to be that cultural markets had successfully cultivated diverse crops by conserving plant breeds and seeds through natural selection and ensuring in continued use. But as global markets began to replace local markets monocultures began to replace diversity. For example, China originally cultivated around 10,000 different varieties of wheat; by the 1970's that number had been reduced to 1,000. The U.S. at one time farmed over 7,000 different varieties of apples, now more then 6,000 are extinct. Industrial agriculture promotes the use of monocultures because of its need for centralized control over the production and distribution of food. It makes it a lot easier for them if they have patents for thirty different types of corn if there is only a total of seventy

types of corn available in the market. In Vandana Shiva's Stolen Harvest, she refers to this ultimate control as " food totalitarianism."

Aside from the death of diversity, another problem that has arisen as a result of the monopolization of the seed industry is the quality of the seeds that corporations are replacing the local seed market with. In order to secure patents, corporations must be able to claim seeds as "their inventions". To do this they breed "new" hybrid seeds that are crosses of original breeds, so they can then claim any seed that has similar genetics as having stemmed from "their invention". Unfortunately these new hybrid seeds are vulnerable to pests and require pesticides that the original seed did not because through natural selection it had a resistance bred into it. But the fact that farmers are forced to buy pesticides in order to save their crop is a huge gain for the seed corporations. As I said before the owners of the seed corporations are also the owners of agrochemical corporations. So they make double the

profit. Because of the additional costs of pesticides that the farmers never needed before, more and more farmers have to buy on credit. There have been many cases where crops have failed as a direct result of pest incidence or large-scale seed failure. Often the farmers, who as a result plunge into debt, commit suicide by consuming those same pesticides. " Also note that a study done comparing traditional polycultures with industrial monocultures showed that a polyculture system can produce one hundred units of food per every five units of input, whereas an industrial monoculture system which requires three hundred units of input for every one hundred units of food." (Shiva. Stolen Harvest)

As if this was not enough corporations like Monsanto have come up with more ways to maximize their profits, while undermining the majority of people in the agriculture business. In 1998 the United States Department of Agriculture in collaboration with Pine Land Company announced the introduction of a new seed to the market: "Terminator Technology". This new invention was a patent that permitted owners and licensees to create and sell sterile seeds. The process of making the seeds sterile consisted of selectively programming the plant's DNA to kill its own embryos. It was designed as a way to force farmers to have to buy new seeds from corporations each year. Monsanto bought the patent on the terms that five percent of sales would go directly into the pockets of the USDA. Monsanto planned to commercialize the technology on the open market. At least seventy eight countries applied to be an owner/licensee (http://www.monsanto.com/monsanto/layout/about_us/default.asp). Fortunately qualified officials who had been studying the new technology announced publicly that there was a serious possibility Terminator seeds may spread their genetics to surrounding food crops. As a result the Consultative Group on International Agriculture Research , the world's most important agriculture research system, stated that they would not use " Term Tech" in its breeding work. Yet corporations stood strong and argued that such technology was necessary for them to recuperate their investments. Finally as a result to international outrage Monsanto stated in October 1999 that they would abandon their plan to commercialize "Terminator Technology". (Shiva, Stolen Harvest)

Not all government agencies are turning a deaf ear to the injustices being done in the agriculture business. One particular project that is taking place through the Agriculture Department at Washington State University in collaboration with USDA and USAID (United States Agency for International Development). This is a project that has sites in both the United States and Africa, in the country of Malawi. The project is focused on dry beans. Beans are a great crop to raise because they are self pollinated. This means that the seeds that the harvest yields can be saved and planted again in the following year. This is especially significant for small scale farmers because generally large scale seed businesses will not do orders for them. It is more cost effective for these corporations to cater to the large scale farms that place bigger orders. Dr. Carol Miles, of WSU, heads up this project, both in Malawi and in the US. I was given the chance to participate in one of the trials in Washington, in the summer of 2004.

The objective of the project was to test breeding lines, rather than varieties of beans. The difference is that varieties are what is sold to the consumers, whereas breeding lines are what these varieties stem from,(they are also referred to as parent lines). In the bean business everyone generally uses the same parent lines, but they want different qualities from these lines carried through to different varieties, depending upon where the varieties are being grown. For example a variety of beans in Malawi who's parentage is Pinto would need totally different characteristics from a bean of the same parentage being grown in Washington; because of the difference in elevation, heat, precipitation, etc.

It was these very characteristics that would be tested in Dr. Miles' bean trials. The parent lines that we were testing were all main market classes. Main market classes are what you can find in your average grocery store: navy beans, pinto beans, black beans, and Great Northern beans. Dr. Miles was able to get these beans through a USDA breeder who works with mainstream agriculture. The breeder provided the beans because the results would benefit him, even though the size of the order for the trials was a lot smaller than what a normal order for an industrial farm would be. Before the breeding lines can be released they have to be tested. Another objective of the breeder's for this project is the cultivation of a

breeding line that is better than the ones already out there, in order to beat the competition.

The project was sited of a total of five on- farm trials in Washington, from Vancouver to Eastern Washington to Lopez Island. At each farm the exact same breeding lines would be planted, a total of eight different breeds, with four standard market varieties. A standard market variety is a bean that has already been approved, released into the market and is selling successfully. The purpose of the main market class is to provide a comparison for the other breeding lines.

So at this point you may be wondering how farmers are persuaded to participate in the project since the main objective seems to be helping their competition, large scale farms, but the project does benefit them as well, because farmers actively participate in the growing of the beans and can actually observe the different stages and draw their own conclusions. At the end of the project, after the harvest, they get to keep a portion of the beans for themselves to eat or, because beans are self pollinated, keep for planting next year. So they are left with a reusable crop.

Because the commercial agriculture industry works on a very large scale and produces crops all across the country. In order to do this successfully and compete with other large scale corporations they cannot look for perfection in their crops. Instead they have to produce a crop that is versatile and will do well in many places, instead of great in a couple of places. On the other hand, small-scale farms can focus on perfecting a crop and are therefore able to compete in the agriculture market by offering the same products but of a higher quality. The bean trials help the farmers to determine how to prefect a breed.

The project is more or less repeated in Malawi, though it is faced with different challenges. Because the culture in Malawi is very old and deeply rooted in tradition, the farmers have many traditions and are very set in their ways. The idea of new crops being introduced is a problem, because farmers are resistant to outside influence. Another difference in the Malawi project is that they are very much a communal people. Though the project only takes place on six individual farms, villagers will some and go inspecting and critiquing the project. This is done not only out of curiosity, but also tradition. The practice of

observing your neighbor's fields and exchanging news with him is very old. Through this the farmers learn about the different crops and can use this information when they are deciding what to plant for the next year (Miles, Carol A.). The project uses a breeder in Malawi who has his own materials, beans that have been saved from previous harvests, which are then planted with the breeding lines from the States and the two are compared. Then at the end of the trial, after the harvest, as in the US trials, the farmers are allowed to keep a portion of the beans and can plant them again next year. Both the US trials and the Malawi trials are beneficial to the farmers and the agriculture industry

(Http://SystainableSeedSystems.wsu.edu/).

In the summer of 2004 I was given the opportunity to participate in the Lopez island branch of the dry beans trial, which was going to take place on Henning Sehmsdorf and Elizabeth Simpson's farm, S&S Homestead. This would be the second such trial done at the farm. The previous summer Dr. Sehmsdorf and Dr. Miles ran a dry beans trial, growing heirloom beans. This year Dr. Sehmsdorf agreed to participate in the breeding line research, which would begin in May of 2004. At the time Dr. Sehmsdorf was teaching an Agriculture Science class and decided to offer the project to his students. I had been working at the farm every Saturday, in addition to the class, and I was excited at the chance of getting involved with the bean project. So I met with Dr. Miles and Dr. Sehmsdorf to lay out the schedule for the project and learn what my role would be. Dr. Miles had decided that we would plant on the 18th of May, so that the beans would be ready for harvest the first or second week of September. They had decided that the entire Ag. Science class would help in the planting. My job would begin a couple of weeks after. Specifically I would come three days a week, Monday, Wednesday, Friday, and stay anywhere from a half hour to three hours, depending on what I was doing that day. My tasks would include recording information and maintaining the beans. The information that I was responsible for collecting would be to record the date of fifty percent emergence, date of first flower, date of fifty percent flowers, plant height at fifty percent flowering in centimeters dated, and plant stand. I would also be responsible for weeding out between the rows of beans,

and keeping a journal of the project.

On the 18th of May the Agriculture Science class met at the farm to begin the planting. Dr. Miles was there with the dry beans we were to plant. The beans, main-market classes and standard market variety, were to be planted four different times each in ten foot plots. This required five and a half rows, each row measuring 150 ft. before we could plant we had to make furrows in the ground with pick axes and clear out any rocks that would hinder the beans growth. Then we began to plant. We had approximately 160 beans for each 10 foot plot. Each individual plot was labeled with a number, rather then the breed name. This is the standard method used because if a bean is anonymous, referred to as a number rather then by name, it prevents biases in the data collector.

After the beans were planted I had a meeting with Dr. Sehmsdorf and Dr. Miles to outline my future schedule. I would need to start my tri-weekly visits to the farm in about three weeks. The first data that I would need to collect would be fifty percent emergence. This would occur when about sixty sprouts were showing in a plot. The timing would be different for each plot and may not be regular even for beans of the same breeds.

Three weeks after May 18th began to visit my beans. Ii was very exciting because there had been so much change. At this point I had been helping to plant at the farm and in my own garden at home quite a bit, yet the miracle of growing had not yet ceased to amaze me. To looking at the tiny sprouts I was filled with wonder. To think that these tiny, fragile looking things would one day grow into large, sturdy plants, capable of providing the essentials that we humans need to survive...It was amazing. To know that I would have some part in that, made me proud and filled with a determined purpose.

The date of fifty percent emergence for the first plot passed and was closely followed by others. I settled into a steady rhythm of weeding, tending, and recording. Because last summer Sehmsdorf had decided to build a six foot fence around the perimeter of the field. Unfortunately at this point the fence was not finished and so we were forced to resort to other measures of precaution. Spreading Dr. Sehmsdorf's

dog's discarded hair through the patches, as a way to scare the deer away and then a type of plastic netting over the fragile seedlings. Soon though the fence was done and we were able to remove the netting.

Another obstacle that presented itself was the dry, hot weather we were experiencing. Fortunately when we planted the beans, Dr. Sehmsdorf had us lay drip hoses in the bottom of the furrows, so that we would have an efficient way to water the plants if there was a lack of rain. S&S Homestead supplies water to its land through a sustainable system. The water source is a pond that they dug when they first started the farm. The pond is filled with rain water and so is self efficient and completely renewable.

As the summer went by I recorded more data: date of first flower, date of fifty percent flowers, plant height at fifty percent flowering in centimeters dated, and them finally plant stand. Plant stand is a measurement of average quantity, in which I measured two and a half feet in from both ends of a plot and then counted the number of plants in the five feet of middle section left. I developed a technique for the weekly weeding: I would begin with a pick axe walking up between the rows and hacking at the roots of the weeds that had sprung up. I would then go through and collect the weeds in wheel barrow which I then emptied in the compost pile. After this I would weed the actual rows, a much more precise task. I would use a trowel to get to the roots of the tougher plants, all the while making sure to avoid the roots of the beans. The majority of weeds were mustard, which the bugs appeared to love. The bugs never went after the beans, perhaps because of their developed taste for the mustard. There were always lots of lady bugs and no trouble with aphids, which I am sure may be attributed to the lady bugs. Things went very smoothly and in about the middle of July the plants began to bear fruit. The fruit were long and beautiful. Some were flecked with purple and all the most startling shades of green. I could not resist the temptation to try them and I was not disappointed. They were sweet and crunchy and when I bit into them flavor so intensely fresh burst in my mouth, it made me wonder how anyone could ever eat anything not just off the vine. (Note: All data and notes from my journal are featured at the end of the paper, including water log, problems, and pictures of bugs and plants).

As September approached and the summer came to an end I found myself with not very much to do. For the time had come for the beans to dry out so that when we harvested them we could collect the seeds to be analyzed and then replanted. All was going well and then about a week before the scheduled harvest a buck got into the field and had his way with our precious plants. Dr. Simpson walked down early one morning and caught him in the act. We were shocked, so far as any of us knew deer were not supposed to be able to jump six foot fences. Dr. Sehmsdorf could testify to this for in his thirty five years of farming no deer had got into his orchard which was enclosed by a six foot fence. We were disappointed and crest fallen. Fortunately there were enough plants left for Dr. Miles to collect and take to analyze and beans left for Dr. Sehmsdorf to keep.

The day of the harvest dawned bright and sunny and as we all assembled to pull up the plants I had very mixed feelings. I was glad in a way that the project was over and grateful for what I had learned, yet also sad for it was the end of something I had gained tremendously from. We worked fast and within an hour had harvested the middle five feet of each plot that Dr. Miles told us to gather from, (some of the plots had been so badly destroyed from the deer that there was simply nothing left to collect). We left two and a half feet at both ends of each plot to be gathered later by our Agriculture Science class and kept at the farm. Then Dr. Miles left to catch the ferry, taking the beans with her to be analyzed at the lab in Vancouver. There many tests would be done to analyze the success and defaults of the breeding lines. These conclusions would be shared with the breeder who would use the information to determine what breeds to use as parent lines. My part in the project was complete.

The one thing that all people in the world have in common is food. Food is our life source. Food sustains us, it is what we cannot do without. In our world today it is easy to forget that the food you eat did not just appear in your grocery by magic. It began with a seed. Something so small that if you dropped it, you would more than likely never see it again. Yet from that tiny organism came our source of life. We cannot forget the farmer who tended that seed and is responsible for what it became. Yet the farming

business, the knowledge of the seed is being compromised, abused, without our consent and without our knowing. If you truly take the time to stop and examine the process of growing, you cannot help but marvel, for it is truly a miracle. We must not let ourselves forget that or the results will be disastrous. Fortunately today there are things being done, people fighting against corruption in the agriculture business. Projects like Dr. Carol Miles' bean trials are paving the way for the survival of local markets and small scale farmers. Until recently India's sacred tree, the Neem Tree, had been patented by an American company, Thermo Trilogy. The Neem's seeds have a fungicidal quality that indigenous people have known about for centuries. Yet Thermo Trilogy was still able to claim they had discovered this trait, thus it became illegal for people to use the seeds without paying fees to Thermo Trilogy. Last week the patent was revoked, for the first time in history, as a means of protecting traditional knowledge and practices. (Http://www.organicconsumers.org/organicbytes.htm) Actions are being taken, there are people who care, the future is not as bleak as it may appear. If we do not forget it is the farmers that grow our ana, it is the seed that ana comes from and that we are all connected through ana.

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