

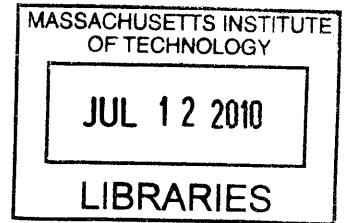
# Distant Harvest: The Production and Price of Organic Food

by

Morgan Sherburne

B.A. English, Creative Writing  
Grand Valley State University, 2006

M.F.A. Creative Nonfiction  
University of Minnesota, 2009



Submitted to the Program in Writing and Humanistic Studies in Partial Fulfillment of  
the Requirements for the Degree of

Master of Science in Science Writing

**ARCHIVES**

at the

Massachusetts Institute of Technology

September 2010

© Morgan Sherburne. All rights reserved.

The author hereby grants to MIT permission to reproduce and to distribute publicly  
paper and electronic copies of this thesis document in whole or in part in any medium  
now known or hereafter created.

Signature of Author.....  
Graduate Program in Science Writing  
May 20, 2010

Certified by.....  
Robert Kanigel  
Professor of Science Writing  
Graduate Program in Science Writing

Accepted.....  
Thomas Levenson  
Professor of Science Writing  
Director, Graduate Program in Science Writing

# Distant Harvest: The Price of Organic Food

by

Morgan Sherburne

Submitted to the Program in Writing and Humanistic Studies on May 20, 2010 in partial fulfillment of the requirements for the degree of Master of Science in Science Writing

## ABSTRACT

Organic food is growing in popularity, enjoying a 15 to 20% increase in sales, yearly, since about 1997, according to the Organic Trade Association. Organic produce makes up about 2% of the United States' total food sales—and because it doesn't rely on synthetic pesticides or herbicides, some view it as more environmentally friendly than its conventionally grown counterpart.

But it's a complicated way to farm. A truly organic method of farming, according to Sir Albert Howard, the British grandfather of organic methods, uses crop rotation, compost as fertilizers, and grows a plethora of produce. Organic produce is expensive to grow in this way, and it hits consumer pocketbooks with a wallop. Produce from large-scale organic farms is less expensive, but those large-scale farms do not challenge the way food has been grown, says University of California - Santa Cruz professor Julie Guthman. They grow in monocultures, like conventional farms, and use large amounts of organic fertilizer and pesticides. They also take advantage of migrant labor. And after this, customers can expect to pay up to 50% more for an organic diet compared to a conventional one, according to *Consumer Reports*. If we eventually switch over to a more sustainable way of growing our food, we could, says MIT agricultural historian Deborah Fitzgerald, experience the gentrification of our food system.

Thesis Advisor: Rob Kanigel

Title: Professor, Graduate Program in Science Writing

### Acknowledgements:

I would like to thank my thesis reader, Philip J. Hilts, for his valuable cache of knowledge regarding United States farming history. I would especially like to thank my thesis advisor, Rob Kanigel, for his incredibly close attention to detail and near limitless patience.

## Distant Harvest: the price of organic food

### The Organic Entree

My brother and I used to run barefoot behind my father's tiller as he plowed our garden; only the occasional stick or sharp stone interrupted the feel of that dirt between our toes. That northern Michigan earth was, after the tiller's blades, velvet. Our family's garden existed in part thanks to the tradition of kitchen gardens, which nearly everyone cultivated when my parents were growing up. Our garden, too, was my parents' measured response to the back-to-the-land movement that swept through the United States while my father was in graduate school in the early 1970s.

My family grew, in one earthy patch of soil, beans, tomatoes, corn, carrots, radishes, and other basics. In another patch – this section almost entirely sand deposited by the glaciers that last retreated from Michigan ten thousand years ago – we grew strawberries and raspberries until a severe drought in 1989 destroyed the plants. In all, our fruits and vegetables grew from a half acre of earth.

An acre, depending on whom you're talking with, is either a very large piece of land, or a very small one. A house in the suburb of a city, with a decent-sized lawn, might occupy a quarter of an acre, which seems plenty for a backyard game of catch. An average-sized corn farm in Iowa might be able to fit 136 football fields within its 180 acre bounds. Regardless, whatever is growing – suburban lawn or corn – it is growing out of soil.

So walk outside. Scoop up a handful of that dirt. In it are billions of microbes ranging from fungi to yeasts to earthworms. There are more species of bacteria, microbes, and protozoa than there are plants, trees, and animals we can see with the naked eye in the Amazon rainforest. There are so many that sometimes soil scholars

simply try to categorize the *types* of microorganisms they find rather than name individual species.

Some types of bacteria suck methane – a major greenhouse gas – out of the air and break it down into carbon and energy. Other types of bacteria are the only organisms that ingest nitrogen and break it down into something useful for plants. And most bacteria work on decaying leaf litter into thick, rich soil. It is this – the breaking down of vegetable matter and leaf litter – that is the basis of soil fertility.

Organic farming relies on natural manures, crop rotation, and focuses on growing a diverse range of produce in order to maintain soil fertility. Natural fertilizers like livestock manure, leaf litter, vegetable and food waste, and even grass clippings from local communities stew in a pile until they meld together and become a thick, black loam. From this soil, organic farmers grow crops in cycles: one field might raise several different breeds of plants which use and replenish different nutrients in the soil over the course of a single growing system. Nutrient-hungry crops like corn alternate with nutrient-replenishing crops like soybeans. Deep-rooted crops like tomatoes should alternate with shallow-rooted crops, like onions. If a farm's soil is fertile, and if the correct combination of plants are grown in symbiosis with each other, organic farmers hold that they do not have to rely on synthetic pesticides or fertilizers.

Organic farming's American grandfather, J. S. Rodale, described his practice by the basic tenet, "Healthy soil, healthy food, healthy people." He echoed the criticism of Sir Albert Howard, the British founder of the organic farming movement and Rodale's mentor, who wrote in his seminal book, *An Agricultural Testament*, that "artificial manures lead inevitably to artificial nutrition, artificial food, artificial animals, and finally to artificial men and women." Howard, who was knighted in 1934 for his farming efforts, based his philosophy on years he spent observing farms in India as an agricultural scientist for the British government.

Howard had a philosophical approach to organic farming: each level of farming, he posited, was interrelated. Soil health was the basis of plant health. Plant health was the basis of animal health, human or otherwise. Any misstep in the chain resulted in missteps later in the chain – hence his belief that fake fertilizers led to fake people. To make the soil healthy, it must have a robust mixture of animal manure and plant matter, called compost, added to it. Farms always raise mixed crops; those mixed crops were

fertilized in part by the livestock also required to farm. That which the soil produces must return to the soil: the waste from, say, corn (its stalks, its leaves, its husks, cobs, silk) is not waste at all. It is composted, along with offal from pigs who might feast on that corn, and added back to the soil. The loop of the farm is closed: soil gives rise to plants, which feed people and animals, which add discarded items (manure, leaves, or otherwise) to the compost heap, which is added back to the soil. Even sewage sludge, according to Howard, was not off limits.

In 1990, the United States Department of Agriculture established a set of guidelines by which produce could be deemed organic. The USDA echoes Howard's philosophy but writes a little more clinically: organic production must integrate "cultural, biological, and mechanical practices that foster cycling of resources" and "promote ecological balance, and conserve biodiversity." Also, the food produced must not be touched by synthetic pesticides.

Organic farming is easy on the mind: natural people cultivating natural food using natural soil enhancements. Because they don't use petroleum-based pesticides and synthetic fertilizers, organic farmers feel they practice truly sustainable agriculture.

But one problem is that it's *hard*. It's slow. It's expensive. Jim Buckle, a farmer who uses organic methods at the Boston area's last working farm – Allandale Farm – tells me his kind of farming is pretty grueling. Jim's farm's cash crop is tomatoes; during tomato season, he and his team of workers begin harvesting at 5:30 in the morning, and stay until seven in the evening to pack their tomato orders. He and his team put in seventy to eighty hours of work per week for 25 weeks. He says, "Now that I'm getting a little older, I can't go and harvest like these younger guys. These guys can really fly through stuff." He's thirty-three.

One reason for his hard work is the piecemeal nature of organic farms. If a requirement of true organic farming is a diversity of crops, then you have to harvest each crop individually. One combine – a reaping, threshing harvest tractor – will not pick your strawberries, pluck your raspberries, pull your carrots, dig your potatoes, or clip your dill. Each of these fruits, vegetables, and spices must be picked by hand. And, based on organic's idea of crop rotation, Buckle plants each of his fields three, four, or

five times – so each field requires more than one harvest. It is intense physical labor – a kind of labor that seems to wear a guy out by his third decade.

That combine is a one-time investment, too, though one can imagine its upkeep is not cheap. But the tractor will do the work of a whole crew of farmhands, a crew of farmhands that would require an hourly wage. Planting, weeding, irrigating, and harvesting fields of vegetables several times over in a single growing season requires a lot of paid man hours.

And after all this – the weeding of acres of vegetables by hand, the stooped labor of harvest, the intricacies of crop rotation and soil maintenance – many wonder whether organic farming can produce enough food to become more than simply a niche market. Can the kind of farming which saps so much energy from the very people who uphold it produce *enough* food to feed the world? Can we manage the soil so that each slice of the world is fed, comfortable, full-bellied? As the world population surges toward nine billion people – expected to hit that mark by 2050 – many, like University of Nebraska’s agroecologist Ken Cassman, wonder how the world will grow enough food to feed itself by any means of agriculture, let alone organic. Others wonder about areas of the world where irrigation and pest control is a serious problem, where infrastructure is so fractured or nonexistent that distributing food is an issue. Sociologists worry about organic’s high price. And some of our nation’s poorest simply want to eat.

As a young man during the height of the Depression, Norman Borlaug attended the University of Minnesota where he led a group of youth in the Civilian Conservation Corp. These young people, he noticed, had hardly eaten a square meal in their lifetimes. Their emaciated images stuck with him.

Years later, after his undergraduate degree, graduate studies, and time spent working for DuPont during World War II, Borlaug was invited to Mexico by his former Minnesota mentor, Elvin Stakman. Mexico had just been struck with a fungus, called “rust,” that affects wheat. It now relied almost entirely on importing its wheat from other countries. Stakman, who had developed a rust-resistant strain of wheat achieved by cross-breeding other cereal crops, had been working to introduce this wheat in Mexico. He was there at the behest of the Rockefeller Foundation, a United States-based philanthropy whose stated goal is to improve the standard of living for people

worldwide by improving crop yields through scientific research. And he needed Borlaug's help.

Borlaug went to Mexico. He lived there between the mid 1940s and 1960s, all the while breeding thousands of wheat strains. He ended up with a handful of strains, each with a few things in common: high yield potential and a short, stocky stem that would hold up under the weight of its own wheat kernels. The strains were immensely successful. So successful, in fact, that by 1963, only four percent of the wheat growing in Mexico was untouched by Borlaug's hybridization breeding. The world took notice.

In the 1960s, Pakistan and India teetered on the edge of mass starvation – and tensions, due to, in part, to famine, were high. Again, Borlaug was called. He toured India, set his teams of agri-scientists working on the problem, and within five years, had implemented his Mexican wheat strain and set India and Pakistan on the fast track toward self-sufficiency. Pakistan grew all its own wheat by 1968; India all its own cereal crops by 1974. These high yield crops worked only in symbiosis with fertilizers, pesticides, and irrigation – but they worked. Borlaug's work sparked a revolution in farming that relied heavily on technological advances to drastically increase the amount of food farmers could produce. This revolution was called the Green Revolution, and Borlaug was named its father.

The Green Revolution pushed these new strains of crops into existence with aggressive inputs. But the revolution grew these crops for a very humane reason: people were starving, and scientists wanted to feed them. As a result of the Green Revolution, food became widespread and accessible. As grains flooded the market, their cost per bushel dropped – basic supply and demand – and people, over a period of just a few decades, were eating *cheap* food.

Borlaug began helping other countries begin their own high-yield farming methods. He was awarded the Nobel Peace Prize in 1971, the United States Medal of Freedom in 1977, and the Congressional Gold Medal in 2007 – one of only six people to earn each of these awards. Over the tenure of the Green Revolution – between its success in Mexico, Pakistan, India, and later in Jordan, Turkey, Indonesia, South America, and Africa – Norman Borlaug is credited with almost single-handedly saving over a billion lives.



But the Green Revolution is taking a toll on our environment. Industrial farming requires more water than farmed land can produce or sustain. Synthetic inputs are also unsustainable: they're petroleum based. "Big industry does violence to the landscape," says MIT agricultural historian Deborah Fitzgerald, an Iowa-born agricultural historian. "Rainfall is not enough to support their crops. It requires irrigation, pesticides, and herbicides – these are problems that matter."

Contemporary Indian philosopher, scholar, and ecologist Vandana Shiva points out the underbelly of the Green Revolution. Shiva is an environmental advocate who holds a PhD in particle physics; inspired by the revolution that took place in her backyard, she began speaking out against industrial farming. She writes in her 1989 book, *The Violence of the Green Revolution: Ecological Degradation and Political Conflict in Punjab*, that the Indian government was on its way already to developing ecologically sound bases for agricultural development – bases anchored in redistribution of land that gave Indian peasants real power for the first time ever.

Shiva and organic farmers argue that the very methods the Green Revolution uses – intense pesticide spraying, synthetic fertilization, and single crops grown in a vast monoculture – leads directly to the conditions pests love the most: a vast monoculture buffet. Shiva argues, too, India now risked losing its original crop diversity, resulting in a loss of ecological productivity. Instead of one section of land growing wheat, maize, millets, pulses, and oil seeds, that land just grew one of three of Borlaug's strains of wheat.

Brenda B. Lin, a professor with the School of Natural Resources and Environment at the University of Michigan, writes that agricultural intensification might just weaken the very field its crops grow in. Crops like high-yielding rice and corn are not native to the environment they're planted in; that habitat likely cannot provide the nutrients and water those crops need. Year upon year of this same intense farming depletes the soil's nutrient resources without giving the soil a chance to regenerate. Year after year of artificial pesticide and fertilizer use increases toxins in water sources and accumulate in soil. And all of these pesticides and fertilizers are coming from an outside source; that is, the farm itself is not a closed loop. It relies on inputs trucked in from somewhere else, rather than the natural rhythms of its own systems.

In the United States, similar problems arise. Soybean fields in the Midwest, points out Scott Swinton, an agricultural economist at Michigan State University, became fields of feasts for the soybean aphid beginning in about the year 2000. Since 1950, he says in an interview, soybeans have become the third or fourth leading crops in the United States. When the soybean aphid arrived somewhere around Chicago, it must have thought, Swinton says, "Oh my goodness, look, there's a *lot* of food out here! This is a *great* place to live!" By 2005, some Midwestern farmers were applying pesticides to as much as 60% of their fields.

An organic approach might curb the amount of food one pest would find appealing, and perhaps create habitat for a different kind of bug that might naturally corral the pest. Swinton points out that the soybean aphid had natural enemies, like the ladybug, that can help keep it in check – provided the aphid don't multiply too rapidly. If it does, Swinton says, only insecticides can control it.

Ken Cassman, the Nebraska professor of agronomy and soil science, warned of the environmental effects of current agricultural practices at the 2010 meeting of the American Association for the Advancement of Science meeting in San Diego. In his talk, he spoke of excess irrigation that depletes an area's water table without giving the habitat a way to replenish its resources. Hardly a proponent of organic agriculture – he made no mention of its capabilities of providing food on a large scale – Cassman focuses his research on the problem of feeding a growing world using sustainable farming methods. In an interview, Michigan State's Scott Swinton says something similar. "Sustainable agriculture in a big picture sense would be to have a system of rules or incentives sufficiently flexible that damage isn't caused – instead of having rules that apply to everybody no matter where they are and what their situation is." He wants to focus on outcomes: if we are concerned with nitrates leaching into groundwater, let's prevent that – but not by uniformly banning the use of nitrogen fertilizer. That would have serious consequences in other parts of the world. "One piece of the picture," he says, "is to have flexible incentives that focus on the outcomes we care about and are tailored to particular biophysical settings according to their vulnerability, or, on the flip side, their comparative advantages." Use organic methods, yes, but in conjunction, perhaps, with conventional farming.

Though these methods are a far cry from Howard and Rodale's organic farming belief system, Cassman, Swinton, and others are now calling for a *greener* revolution – a revolution that would produce the amount of food produced by the Green Revolution, but that would attempt to tread a little more lightly on its farmland. Still, as we reach our environment's breaking point with petroleum-based pesticides, the massive machinery required to harvest equally massive yields of wheat and corn – and as those pesticides, herbicides, and fertilizers leach into our groundwater and waterways, some people's thoughts turn back to organics.

## **Hungry World**

In the early 2000s, Catherine Badgley, an ecologist and paleoecologist at the University of Michigan, took her students on a field trip to a small organic farm north of Ann Arbor, Michigan. As part of the class, "Food, Land, and Society," Badgley wanted her students to experience a real, working organic farm. She noticed something peculiar, something critics of organic farming might contest: the farm was growing lots and lots of food.

Curious, she asked the farmer what he might be able to produce any given growing season on his five acres – only three of which were given over to cultivation. "To my surprise," Badgley tells me in a phone interview, "he said he had someone last year weighing up everything that came out of here and we found that it was 27 tons." She pauses, then exclaims, "27 tons? Because it's only about three acres of actual field on this tiny farm. I said if you can grow 27 tons, why can't organic agriculture feed the world?"

To calculate how much food organic agriculture could produce, Badgley and a team of researchers cast their nets far. They gleaned most of the examples of organic yields versus conventional yields from peer-reviewed journal articles. A few came from conference proceedings, some from an agricultural research station, and yet others from technical reports. They were curious to see, contrary to popular belief, whether organic yields were actually very high. In all, they examined more than 90 papers that provided

293 data points about the yields of organic farming in both the developing and developed world.

To help think about every aspect of the food supply, Badgley created ten categories to corral the kinds of foods we eat. They range from grain products and starchy roots to oil crops to meats and fruits. How Badgley calculated organic yields and the global food supply was simple: she and her team measured how much food existed in the world in the 2001 reports of the Food and Agricultural Organization. To calculate the organic food supply for the world, Badgley multiplied the current amount of food in the global food supply by a ratio that compared the amount of food produced by an organically-grown field to a conventional food. So, they write, if an organic farming method produces a crop at 96% the rate of the same conventional crop, its yield ratio is 0.96.

For example, in 2001, the FAO reported that the world grew 775 million tons of vegetables, using some of the 1.5 billion hectares – or about 3.75 billion acres – dedicated to agriculture globally. After losses due to spoilage and other transportation factors, this number drops to 681 million tons of vegetables. From their research, Badgley and her team calculated the total average yield ratio for organic vegetables produced in the *developed* world. For this first result, they left out farming potential in the developing world. They found that the average yield ratio for organic vegetables is 0.876: vegetables grown by organic methods are produced at 88 percent the rate of their conventional counterparts. This results in an estimation that organic farming could produce, after losses, 596 million tons of vegetables. The team from Michigan found that organic could produce food at 92% the rate conventional farming could in *developed* countries alone.

But it is difficult, Badgley realized, for most people to think about the amount of food required by the world in terms of crop yields or tons of carrots, cabbage, and corn. “Usually people don’t have a very good concept of how many kilograms or tons or bushels or whatever per hectare translates into calories per person per day,” she says. Once that conversion is made, “all of the sudden, things start to make a little more sense.” The current world food supply provides each person with 2,786 calories per day; the average daily requirement for an adult is between 2,200 and 2,500. In their first

model based only on agriculturally-available land in the developed world, Badgley's team found organic food could supply 2,641 calories per person per day.

Then they factored in the amount of food that could be organically farmed from agriculturally arable lands in developing countries. Why are their methods already considered conventional? If local rice farmers in, for example, Indonesia are using their traditional methods of farming, Badgley says, one might consider their "low-intensive methods are organic by default." But, she explains, "They're also not often using the benefits of a lot of ecological knowledge that now goes into farming in the developed world." These benefits include soil amendments like composting or companion planting. Around Ann Arbor, Badgley says, farms even use muck rich in organic matter and nutrients dredged from local ponds. Some farms in developing countries have begun accessing this knowledge, using things like "microbial sprays for pest control or leaf litter from trees in agroforestry systems for fertility, or for just maintaining soil moisture." When the indigenous farming systems start employing some of these techniques, their production increases.

So when Badgley's team factored in the agricultural land base from developing countries considered conventional, they found that organically farming the world over would supply 50% more food than the amount produced right now. This would be enough, they said, to support a larger world population without increasing the world's farmland – and the food produced on land in developing countries in conjunction with the food produced in developed countries would provide each person, each day, with 4,381 calories.

This is a remarkable number, but Badgley asserts, "we tried pretty hard in the paper per se not to overwork the results – but stressing that [organic] has potential and therefore deserves a lot more attention in terms of research support." In fact, she says, they may have underestimated organic's power because of the way some organic farmers grow food. A farm adhering truly to Howard's philosophy of organic would grow many different crops in close proximity to one another – alfalfa would grow alongside corn. Corn grows cheek by jowl with soybeans. Soybeans might grow in the shade of squash. And all of this works in (theoretical) ideal symbiosis to produce a variety of vegetables. But for their study, Badgley's group could only compare yield ratios of monocultures, thus failing to capture organic at its best and most productive.

Much of organic food is produced in polycultures, which have no corollary in conventional farming. Badgley could therefore not use much of the data from traditional organic farms. "Organics are often grown together," she says "and there are often cases where you get higher yields in polyculture than you do in monoculture." She continues, "we made that point just as a sentence, but this means that, if anything, our estimates are likely to be lower estimates of the capabilities of organic systems."

Still, scientists like Cassman question organic's ability to feed the world. He and his fellow panelmates at the 2010 meeting for the American Association for the Advancement of Science are concerned with whether the world can feed itself over the next fifty years – let alone sustainably. Jonathan Foley, from the University of Minnesota's Institute on the Environment, spoke of sustainable farming – but not sustainable farming the way Rodale or Howard would have envisioned it. By 2050, Foley said, the world population will reach over nine billion people. We will need to double – perhaps triple, he said – our global food production over the next three or four decades.

Population growth aside, David Lobell, a fellow in Stanford's Program on Food Security and the Environment, listed climate change as another confounding factor. Climate change's potential effects on crops are many. University of Michigan's Brenda Lin explains the anticipated problems of climate change. She writes that temperature is a critical threshold for crops: "high temperatures that coincide with critical phases of the crop cycle can dramatically lower yield." For example, she writes, corn's reproductive ability is reduced when temperature exceeds about 97 degrees Fahrenheit. Rice's pollen can become sterile at 95 degrees. She points out, too, the rising incidence of "extreme climate events, such as category 4 and 5 hurricanes." These sudden weather events – which also include extreme high temperatures or extreme low temperatures on a single day – also negatively affect crop yields. In an experiment, Lin shows that a heat wave will damage the developing flowers of wheat, resulting in lower crop yields. By 2030, the climate will be a modest threat, Lobell says, in his AAAS talk – its effects on crops will raise agricultural prices by 30%; if global temperatures rise 3.6 degrees Fahrenheit, tens of millions of people could be pushed into food insecurity.

Each speaker mentioned agroecology, but none mentioned organic agriculture until the question and answer session. A gentleman in the front row asked how organic

agriculture could contribute to this expected food crises. The moderator, Jonathan Foley, said “only 0.6 percent of the world’s agricultural land is organically farmed. Organic farming cannot feed the world, nor will it.” But if that percentage expands from 0.6 to ten or twenty and research dedicated to organic methods ramps up, Badgely’s study suggests organic farming could take a giant step toward feeding the world.

Catherine Badgely tells me in our interview that her study shows organic farming “deserves a lot more attention in terms of research support.” She continues, “in a lot of places, there’s very little research money going toward organic – it’s mostly been going to the Green Revolution methods, and you know one of the reasons that the Green Revolution’s methods do so well, among several, is that there’s been 50 years of fantastic research support for those methods.”

Investigation into organic farming methods is necessary as an alternative to the Green Revolution methods that currently dominate conventional farming, she says. “One would find more suitable varieties – it might be necessary to breed certain varieties for certain soil conditions or climatic conditions,” she argues. Still, she says, “as much as anything, we’re arguing not so much for an immediate transformation because I’m not so sure that’s quite appropriate at this moment.” But she asserts that organic farming would “do nothing but improve under research.”

Too, Badgely says, food access often is the culprit in leaving people hungry, rather than a lack of food production. She is currently heading up a research group that will look at Africa’s capability of feeding itself. “It’s surprising when you aggregate the FAO data...half the countries in Africa produce in aggregate more than enough calories to feed everybody well in their countries – and yet other countries don’t. Some are miserably below these values.” She points out that those countries are those that had riots over food prices – and that the issue of food prices and access to food is “every bit as important as yields.”

“There are lots of different policies, some of which have positive influences, some of which have negative influences,” she says. “But if people aren’t willing to look that in the eye, then maybe they’re never going to change that; it doesn’t matter how much food you grow. There’s always going to be people who don’t have much access to it.”

Organic farming has the potential to feed the world. At least, Badgley's research argues, it can produce the calorie count needed. And the calorie count might only rise if the same money were poured into the research of organic farming as was poured into the Green Revolution. Howard's philosophy of farming was just starting to get its toehold when India teetered toward starvation and suddenly millions of people needed food. The Green Revolution, at that time, could provide that. While the Green Revolution's aggressive irrigation and pesticide use was necessary, organic espoused a method of doing things that seemed almost too—*simple*.

### **Ain't Gonna Work On Borlaug's Farm No More**

A little more punk rock than overalls, Farmer Jim Buckle has tattoos creeping out of the sleeves of his sweatshirt, crawling up his wrists. One is a bean plant sprouting from a seed. The other is an entire radish plant, from its roots to its leaves. Farmer Jim, tattoos and all, is going to lead me on a tour of the farm he oversees—Allandale Farms, in Chestnut Hill, Massachusetts—that has been feeding its neighborhood on organically-grown produce for 250 years.

Jim's farm is representative of a pocket of the organic food movement: the locally-grown, sustainable, and independent farm unconcerned or overwhelmed by the formal organic certification process. "Our goal is to get the healthiest locally grown food we can," Jim, explains to me. "We're not necessarily committed to organic food." Jim tells me he is not so much concerned with holding to the regulations in order for his farm to be certified organic. He's more concerned with holding his farm responsible for producing food that is farmed sustainably and that is sold locally. "I think the push on people right now is, is it better to get local, conventional food, or organic food from Chile?" Jim says in a later interview. "People, most of the time, are going to choose local, conventional food. So it's someone like us who is operating 95% compliant to the organic role."



Organic certification is difficult, as decreed by the USDA Organic Foods Production Act of 1990. But it's largely necessary because of the age-old propensity for people to try to scam one another.

Just after the swell of organic farming in the 1970s in the United States, a few enterprising farmers wanted to capitalize on their products, writes Samuel Fromartz in his book *Organic, Inc: Natural Foods and How They Grew*. The only problem was that their food wasn't organically grown. They just peeled off their conventional labels and pasted on ones advertising organic food. Smart, but not exactly ethical. And so the USDA stepped in. Section 2105 of the act sets out what organic food *is* in no uncertain terms. It must be produced without synthetic chemicals or fertilizers – and it must be grown in fields that haven't been treated with synthetic inputs for three years. The act stipulates that farmers cannot label produce as organic unless it has been certified that the food has been produced without these inputs.

Production is one thing; certification is another. The USDA organic certification process is not simple, which turns farmers like Jim Buckle off. According to Jim Bingen, professor of food, community, and agriculture at Michigan State University, one way of guessing how many farms might use organic practices but eschew certification is to look at how many farms choose recertification after an agency folds. In one example, when the Organic Growers of Michigan closed its doors, only half of the 200 farmers certified at the organization sought out another agency, some of the rest, presumably, persisting in organic practice.

According to the National Sustainable Agriculture Information Service, a farmer trying to certify his produce as organic has to present the history of his land use to the organic certification agent. He also has to provide maps of his fields, plans for crop rotation, plans for improving the farm's soil, how he will manage pests, where he will get seeds for his crops, what kind of fertilizers, compost, manure, soil additives he may use. He will have to lay out how he will buffer his organic fields from any conventional fields he might farm or other conventional farms that might border his. He has to document his planting and harvesting equipment – his tractors, combines, tillers. He needs to keep track of his harvest and sales records, his planting, his farm production, and how he labels that produce.

If he processes his food – for example, if he makes jam to sell from his organic raspberries, he has to document the sources of his ingredients: where the pectin comes from that binds fruit together into jam; whether the pectin is organic. Where the sugar added comes from; whether the sugar is organic. He has to ensure his organic raspberries aren't boiled down for the jam in the same containers that conventional raspberries might be cooked in – to ensure that the jam hasn't commingled with conventional raspberries or that it hasn't been contaminated with the faintest whiff of those raspberries' pesticide-laden former lives.

And that's just the paperwork. The farmer hasn't even scheduled a visit with a government inspector yet. Some farmers, like Rodale, see the USDA regulations as necessary in order that people don't pass off conventionally-grown or substandard vegetables as organic. Jim Buckle just sees it as a hassle. "You have to disclose everything about your business," Jim tells me later. "What do you sell, to whom, what, when, why, for how much, and it just seems a little too invasive."

Jim's farm consists of 38 cultivated acres and about a hundred more dedicated to roads, wooded lots, pasture land, housing, and the parking lot – at the head of which sits the farm's produce stand. Behind the produce stand, a one-ton truck idles. I have been waiting in the chilly wind of this blue-sky fall day while Jim arranges displays of baskets and autumn chrysanthemums leading into the produce stand. After he's taken care of a few last-minute touches before the produce stand opens at ten a.m., we climb into the truck, and the tour of the farm begins.

We drive away from the produce stand, past a house, on a rutted two-track road through a wooded area, and come out alongside a strip of land. "This is sort of like the beginning of the farm," Jim gestures toward the long, thin field. The planted area of the field is almost indistinguishable from the grassy area surrounding it. The long, thin furrows of soil for growing plants are separated by humps of grass and littered with what looks like rock. It seems unlikely much would grow in here at all.

As we pass several skinny ribbons of field, Jim says, "it's not like a traditional farm where we have one big vast openness of land. We have small sections like this – this strip here." He shows me a piece of land barely larger than a combine tractor. "This was planted five times – green beans once, lettuce and herbs, salad mix." He's right: erase from your mind any image you may have of rolling fields, a pastoral red barn and

an accompanying silo that may be actually nestled somewhere in Wisconsin. At one point of the tour, we pass what looks like a development of condos overlooking Jim's fields.

Jim adheres closely to organic methods. He may use a pesticide from time to time, but he mostly uses only organic controls like liquid copper as a pesticide and sodium bicarbonate as a fungicide. He composts corn husks and fruits or vegetables that go bad from the produce stand, grass clippings and leaves from the local landscapers in the Brookline and Chestnut Hills areas of Massachusetts, as well as animal manures from the flock of chickens and two Scotch Highland cows – an heirloom variety, Jim explains – and chickens on the farm. I had seen the cows earlier: they didn't look like any sort of cow I had seen before. Long-haired, dark brown, and wooly, they looked less cow than yak.

As we drive alongside another thin field ("Radicchio, scallions, arugula, mustard greens, lettuce greens," Jim says), I ask Jim if he's considered the USDA organic certification. He snorts. "It's impossible. We don't do it," he says. "We just don't do it because it's just too much money." Though the cost of organic certification varies a little depending on which USDA-accredited agency certifies the farmer, and though the USDA is now developing cost-share programs for organic farmers, the fees for organic farming go something like this.

According to the National Sustainable Agriculture Information Service, a first-time organic certification can cost up to \$2,500 for a farm grossing over \$500,000 in organic produce sales, depending on whether a farmer uses an accredited private inspector or a state certified inspector. Additionally, a farm of that size has to pay 0.1% of its total sales over \$500,000. After that, a yearly recertification costs about \$150 less than the first fee. In all, Jim figured the certification would set him back about \$15,000. "\$15,000 is a salary for someone's summer," Jim says in a later interview. "Someone could earn fifteen grand. I'm not going to give up a laborer to have a stamp."

The certification cost doesn't take into the labor hours required by an employee to fill out the certification paperwork. Not to mention the labor-hours required to meet with inspectors. And the production hours lost to the rule that a field must transition from conventional to organic over a period of three years – which is a bit arbitrary

because herbicides like RoundUp leave soil quickly, whereas pesticides like DDT can remain in the soil up to 30 years.

If a farmer chooses to grow crops in a field in transition, he cannot label its produce as organic. He puts the labor required into producing essentially organic vegetables without reaping the money those vegetables would bring in. “And I don’t have time to fill out paperwork,” Jim continues. “I don’t have time to hang out with an inspector, like, three times a summer.”

“On top of that, I also want the ability to say to my customers, ‘Hey look, we’ve got a really serious problem out in the fields and I need to break the rule and use this spray once. Or I need to use this chemical fertilizer once to get us where we’re gonna go, and I assure you that this is the only time we’re using it.’” Jim says he cultivates a trusting relationship with his clients, most of whom are local. “I need that ability or else we wouldn’t have had tomatoes, which is, like, a problem,” Jim says. Tomatoes, his farm’s cash crop, were nearly lost this summer.

“We have a six acre tomato crop that makes or breaks the season for us. This year they weren’t that great.” The field had an early onset of a pest called “late blight.” Normally, the pest descends—if it does—in September, after Allandale Farm has its tomatoes mostly up for the season, at which point the fungus isn’t much of an issue. Late blight has a counterpart, early blight, which is controllable with organic pesticides. But if Allandale contracts late blight at the wrong time, it’s game over.

“We suffered and I had to let people go,” Jim says. “Generally, we get a little production bonus at tomato time and we didn’t get it this year—we just didn’t have the crop. We were only harvesting thirty percent of our average.” Typically, their plants produce twenty-two pounds of tomatoes for each of the 12 to 14,000 plants they grow. This year, Jim was able to glean an average six and a half pounds per plant.

They were lucky to harvest that much. A lot of Jim’s fellow farmers in the area were able to save nothing.

Late blight—the same kind of pest in part responsible for the Irish potato famine—is a fungus that can survive from one season to the next in one infected plant. It is controllable with a fungicide developed in the 1970s—but, of course, synthetic fungicides and pesticides are verboten. One infected plant can launch millions of blight spores into the air.

“And the worst part is that the more people are going to pick, the further the disease spreads,” says Jim. The spores bum a ride on the pickers’ clothing and get transferred from plant to plant. “The more wind there is, the further the disease gets. It came from Texas in a truckload of plants that got distributed through a garden center around here.

“We got kind of...” Jim hesitates. “We got kind of screwed.”

### **A(lmost) Full Circle**

Jim’s farm resembles the small, family-owned American farm that was prevalent up until about the 1920s more closely than it does some of today’s agribusiness and corporate farms. But the two—Jim’s mostly organic farm and early America’s family farm—are very different. The organic farmer is supposed to concern himself more with crop rotation and composting. In this way, the typical family farm in the late 1800s and early 1900s, though it may have looked essentially organic, differs philosophically from organic farming.

Remember your Howard: he believed strongly in the idea of the Wheel of Life, an eastern philosophy he observed while observing farms in India: each aspect of a farm—its livestock, its mixed crops—were interrelated. He saw this idea—that death and life are intrinsically connected, and that the decay of vegetable matter and livestock waste balanced with the growth of vegetables and the plants which fed livestock—play out in those Indian farm fields. He wrote in *The Soil and Health*, “Nature herself is never satisfied except by an even balancing of her processes—growth and decay.” Scientific branches of study like botany and zoology, he argued, paid too little attention to what happened to a plant or animal after it has died. This imbalance of attention he saw as a basis for the fundamental flaw in agricultural science and conventional farming: that we harvest from the soil without replenishing the balance of that soil.

Still, early American family farms and other family-owned farms across the world shared more genetic material with the contemporary organic farm than they might with a large, agribusiness or even corporate farm. For example, the late 19<sup>th</sup> and

early 20<sup>th</sup> century family farms produced a wide range of produce and practiced crop rotation. MIT agricultural historian Deborah Fitzgerald writes that farms in Iowa in 1920, the United States' current top producer of corn, raised thirty four different crops and animals, ranging from geese and gooseberries, to watermelon and bees, to popcorn and currants. Now, that list, Fitzgerald writes, has been pared down to corn, soybeans, hay, cattle, hogs, oats, horses, sheep, chickens, and goats. This may look like a diverse list – a state known for its production of goats! – but notice Iowa's newfound dependence on importing vegetables, sugar, and other produce.

No one farm, clearly, raised the whole range of Iowa's impressive list of fruits, vegetables, meats, and sweeteners, but all of these items were available in Iowa, in 1920. You were a locavore – that term that slowly seeped into the collective American consciousness beginning in the early 2000s – if you were Iowan, eighty years ahead of your time. You could have your turkey and eat your currants too (within reason and season, of course). But what happened to change that cozy ideal of a farm from what we stereotypically imagine (red barns, white and black cows grazing, clucking chickens pecking, bounteous vegetable gardens, and fields of corn or wheat behind the house) to what is the reality for so many farmers now – the long fields of corn, and the \$145,000 harvesting combine tractor?

Enter industrialization, World War I, World War II, and their effects on farming practices worldwide. In the United States, agricultural economist E. Wesley F. Peterson with the University of Nebraska-Lincoln looks, in part, at the culprit of farming's low wages and income in his book, *A Billion Dollars a Day: The Economics and Politics of Agricultural Subsidies*. In 1850, just under half of the United States' population farmed 1.5 million farms. Fifty years later, that percentage dropped by half – only about 20% of the population farmed. Still, the number of farms peaked in 1935 at 6.8 million. But the percentage of those who farmed to those who didn't was in a steady decline: the urban population grew at a brisk pace. Peterson outlines in one argument that higher wages in the manufacturing sector wooed farmers and farmworkers away from their country farms into cities.

With farm labor becoming scarce, other technologies to replace that labor developed. Because of World War I, Peterson writes, there was a swift increase in the demand for food – which required the agricultural sector to ramp up its production,

which in turn asked for advancements in technologies that would enhance crop outputs.

Deborah Fitzgerald, too, argues that with World Wars I and II, the United States faced, for the first time, the challenge of feeding an enormous number of its citizens, a continent and ocean away. A scholar of agricultural history, Fitzgerald wrote the book on how the family farm transitioned into agribusiness. It's called *Every Farm a Factory: the Industrial Ideal in American Agriculture*. She argues that farming, over the course of the early 1900s and, more intensely, in the 1920s, began to model itself on the concepts of the steel and automobile factories. Farmers began to look into mechanization, maximizing the efficiency of their labor, and management, and slowly, the single-family farm grew into large-scale farms, which were " 'a single farm or groups of farms under one closely controlled and supervised management, if the size of its total farm business was at least five to eight times as large as the typical farm business in the same locality producing the same kinds of products.'" Between these several factors: low farm wages, labor scarcity, and a growing number of mouths to feed, the American farm increasingly drew from the streamlined ideal of industry.

After World War II, various technologies like improved irrigation, pesticides, herbicides, fertilizers, and even infrastructure like railways and roads, Fitzgerald writes, continued to develop. Produce was increasingly available throughout the United States—and consumers became comfortable with that offering. In her study of the Iowan food chain, "Eating and Remembering," Fitzgerald points out that exotic fruits and vegetables began appearing on Iowan market shelves, and quotes the *Forty-First Annual Iowa Year Book of Agriculture* that required farmers to produce their fruits and vegetables with such regularity that an Iowan shopper could pick up a package of strawberries in December. Clearly, local farmers could not grow strawberries in the winter, so grocers had to import their fruit. So up came those packages of strawberries on a semi truck from Florida, the peaches from Georgia, the citrus from California.

In Iowa and across the United States, commodity goods like corn, soybeans, sugar beets, cotton, wheat, and barley gradually made up more and more of a farmer's income. University of Nebraska-Lincoln agricultural economist Peterson notes that farmers lobbied for the firm control of government intervention in order to secure an income against what they view as the "farm problem."

The “farm problem,” Peterson writes, arose from the perception that the farming of food and what it produces is highly variable. Any rural Midwestern girl worth her salt (ok, me, anyway) cultivated a fascination with pioneer girl Laura Ingalls of *Little House on the Prairie* fame, and will recall Laura’s family’s tribulations with farming: one year, a cloud of grasshoppers devoured her father’s wheat. One winter of blizzards robbed Laura’s future husband, Almanzo Wilder, of his seed wheat when the snow cut off all shipments of food into their South Dakota town. He had to share his wheat so that everyone in the town could eat. Almanzo and Laura’s own wheat crop, in the first year of their marriage, stood ripe and ready to thresh – only to be beaten down and ruined by a freak hailstorm.

Nature is not kind to farmers. Neither is it mean; it’s just indifferent. Everything alive fights to live – especially that which is blessed with simply a nerve where its intellect should be. Late blight spores, those spores of Massachusetts farmer Jim’s nightmares, don’t have it in for Jim: they just want to reproduce. Crabgrass, a weed that looks like a single clump of grass, plagues the common backyard gardener with an insidious and massive network of roots. One plant will have a single root that, if you’re patient enough, you can just about pull from MIT’s campus in Cambridge, Massachusetts to a citrus farm in Florida. Each pest, each weed, each fungus, and yes, each vegetable, simply wants to propagate. Each animal, each plant, each protozoa fights its way upward toward the sun. My father’s friend’s answer to the time out of mind question, “Who has more fun than people??” Rabbits.

Add weather to the common garden weed’s desire to reproduce and you, backyard farmer or commodity cultivator, have to deal with conditions ranging from an early heat wave’s triggering growth of wheat or soybeans – and next week’s cold snap’s frosting of those new nibs of vegetation. Rely on the mixed weather bag of flooding rain, April heat wave, May freezing, August drought, humidity’s incubation of fungus, shipping’s spread of disease and insect, and the entirely unnatural mood swings of the human economy and market, and you have one seriously unstable – though absolutely essential – way to make a living.

The Homestead Act of 1863 allowed a farmer to claim to up to 160 acres of previously undeveloped land outside of the original thirteen colonies. This is how, should you remember your Laura Ingalls Wilder, Laura’s family finally came to own



their farm outside of De Smet, South Dakota. At the same time, the Morrill Land-Grant Act, established universities to pursue the study and development of agricultural science. The first such university was Michigan State University, in East Lansing, Michigan. Agriculture began to have the benefit of directed study and research funding.

Too, because the production of food is highly variable, as economist Peterson pointed out, farmers asked for government support. The prices farmers were getting for commodity crops shot up during the First World War, but crashed after the war ended. Farmers devastated by the price crash rallied for protection from the market— which came in the form of tariffs and subsidies that would reestablish what Peterson calls “parity.” Farmers believed they should get a price per bushel of wheat that grew at the same rate of the value of everything else sold. “If a bushel of wheat in the past could be sold for a pound of nails,” Peterson writes, “the fair price for a bushel of wheat at a later time would also be equal to the price of a pound of nails at the later time.” Finally, in 1933, Franklin Roosevelt included parts of that market protection legislation introduced in 1924. Protection of farms in the form of subsidies continues today.

The result of these movements? An agricultural system that, Peterson writes, relies on a “complex system of price supports, trade barriers, production controls, and a host of other provisions,” summarized in a 300-page governmental policy called the Farm Bill.

The evolution of some family farms from their origins in the late 1700s to streamlined machines steeped in technology and growing only one or two crops wasn't so much because each farmer farming in the early 1900s took up industrialized farming practices over the course of the next two or three decades. Rather, it was that many family farms slowly collapsed, declined, and were subsumed into the larger corporation of a single farmer, or conglomeration of a farmer and a few of his partners. By 2005, just under 2% of the United States' population worked 2.1 million farms. The average size of a farm in 1850 was 82.2 acres. In 2005, the farm's average size was 180 acres.

As with most things, progress is a mixed bag: the synthetic fertilizers, pesticides, and large machinery is tough on the land it farms. It produces food, though—lots of it—at a cost and volume historically unequalled. And though conventional farming is still not easy, advances made in agriculture reduce the blood, sweat, and tears required to produce that food.

## Putting Your Money Where Your Mouth Is

Years of ever-growing agricultural output produced by ever-evolving farming technologies sank food prices. Bad news for farmers, but good news for you and me. Americans spend the smallest percentage of their income on groceries of any country in the world – a little less than ten percent as of 2004, according to the USDA. But as a person's income increases, the percentage of their expendable income dedicated to their food budget decreases. If you earn \$15,000 per year, you're likely to spend a quarter of your income on your grocery bill. If you earn something like \$40,000, however, your grocery bill probably consumes only about 10% of your budget.

As lovely a concept organic food is, it's expensive. Whatever the arguments about organic farming, one issue is certain: at present, organic food costs more than its conventional counterpart, and for a significant portion of the United States' population, this is a problem. The USDA released a price report that tells you just how much you might pay if you want to go organic. In August of 2007, your organic milk would cost you \$4.16 a gallon. You could buy a gallon of conventional milk at half the price. Your organic eggs would cost, at least, nearly four dollars a dozen. Conventional? Less than half that at \$1.29. Each of these prices, including those of fruits and vegetables, feed into *Consumer Reports'* estimation that buyers of organic food can expect to pay, on average, fifty percent more than buyers of conventional food. This is a hefty sum for the average middle class shopper to shoulder. But for the twelve percent of the United States living below the poverty line, as estimated in 2005 by the Census Bureau, the bill at the grocery store checkout lane becomes more than sticker shock. It becomes impossible.

Imagine this: a city neighborhood demarcated by class. Its rent and property costs are low. Middle class or upper middle class people begin to take note. They move in. Eventually, cost of living in the previously poor area rises to match the income of its new inhabitants. The neighborhood gentrifies. Its original inhabitants are forced to find yet another affordable place to live.

Now imagine this: in a grocery stores, tomatoes cost an average of \$1.77 per pound. Next to them, organic tomatoes may cost twice as much. If, to feed the world, organic farming increases without the cost of its products decreasing – and those organic tomatoes begin shouldering their way into the conventional tomatoes’ bin – the supermarket, too, would gentrify.

Even if Howard’s notion that an organic farm – the farm as its own self-sufficient cell, operating in a closed ecosystem like a section of untouched forest or grassland – could produce enough food for the world to go round, that food may would come at a cost requiring our nation’s poorest to look elsewhere for their sustenance. As we transition, by necessity, to a more sustainable way of growing sustenance, says MIT agricultural historian Deborah Fitzgerald, we may experience the gentrification of our food system.

In spite of its higher price, organic food has grown by leaps and bounds. *Consumer Reports* estimates organic sales have grown twenty percent per year over the last decade into a \$15 billion dollar industry in 2004. According to *U.S. News & World Report*, organic sales in 2008 reached nearly 25 billion dollars. Still, this is only small percentage – 2% – of the total 1,165.3 billion dollars Americans spent on food in 2008, reports the USDA.

Accompanying the growth of interest in alternative food has been the proliferation of literature examining it, recording attempts to grow it, experimenting with cooking it, and wondering how best to eat it. Typing “organic food” into the Amazon book search engine yields over two thousand results.

A few of these books examine the rise of Whole Foods Market, the natural foods grocery chain. Because of its size – per its website, 300 stores across the U.S., U.K., and Canada – the grocery almost offers itself on a platter for investigation, and food literature has taken notice. One in particular, Samuel Fromartz’s *Organic, Inc.: Natural Foods and How They Grew*, addresses Whole Foods with a mix of admiration, skepticism, analysis, and sheepishness.

In the introduction to his book on the business of organic, Fromartz, a business journalist who has worked for the likes of *Fortune* and *Business Week*, writes, “I discovered that Whole Foods had brought many of these specialty foods [hummus, olive

oils, fresh pasta, seafood] into one convenient, upscale setting. Even the lighting was spectacular – it was designed, a marketing consultant told me, to make people look better, feel better, and thus want to buy more.” He wondered how Whole Foods had done it – how it had grown from its original store, called Saferway, in 1974 to a worldwide chain. He wondered how Whole Foods earned \$4 billion dollars in sales even as other grocery stores and chains were cut down by mega-stores like Wal-Mart. His conclusion? “Whole Foods managed to sidestep that fray by focusing on, well, people like me.” People like him are married, at least solidly middle class, with a flexible job (as a freelance journalist) that allows him to do the shopping and extensive cooking required by fresh produce while his wife, as he writes, has a “hellish commute.” This is no criticism; Fromartz acknowledges his rather privileged position.

The Market has alternatively been celebrated and subtly ridiculed. And perhaps for good reason. The antics of its CEO aside (a recent Whole Foods controversy centers around the offer its CEO made to his employees: his workers with BMIs below a certain number were offered greater employee discounts), the grocery markets itself as a morally upright shopping choice. On its paper bags is printed the slogan, “Yes, I have standards. I’m having them for dinner.”

The force of this marketing is clear: this shopping experience is ethically superior. Aggressive marketing is not necessarily different from a typical grocery store. Whether it is rhetoric claiming value or rhetoric claiming moral superiority, a grocery store requires your money to survive. But Whole Foods seems especially a political battlefield that calls into question its customers’ basic morality and ideals.

So what happens if you can’t afford to shop there? You’re sent the message, geographer Julie Guthman writes in the article “Fast Food/Organic Food: Reflexive Tastes and the Making of ‘Yuppie Chow’ ” that there is a dichotomy between fast food (non-fresh and non-organic food) “and slow, reflexive and compulsive, fat and thin, and hence, good and bad eaters.”

The story of the Goodmans, the owners of Earthbound Farms, has hardly gone untold – many journalists have written it. At its inception, the Goodmans’ farm grew some fruit, but mainly organic salad mix. Organic food as a niche market, Guthman writes, began with organic salad mix in California in the early 1980s. The tender mix of leaves gave a “jump-start to the California organic sector, which then became what is

likely the largest in the world in terms of crop value.” Though you can find bagged salad mix of any combination – romaine for Caesar salads, iceberg for a more traditional salad, and mixed baby greens for an exotic one – in almost any grocery store today, bagged salad is rooted within Californian cuisine.

Chef Alice Waters, based in Berkeley, California essentially began the fresh, local, and in-season food movement, Guthman writes. She began buying baby salad greens from Warren Weber for her restaurant, Chez Panisse. Weber was “one of the original self-professed hippie farmers,” a group of farmers who wrote the first U.S. organic certification program with J. I. Rodale in 1971. Other organic farmers began to follow suit, including, Guthman notes, Myra and Drew Goodman.

The two young graduates of the University of California at Santa Cruz grew and sold organic berries and lettuce to restaurants – and invented the idea of washing and bagging their lettuce. That company became Earthbound Farms. Between 1986 and present day, it expanded from one Californian backyard to more than 25,000 acres, with plots of land in five different countries, reports Samuel Fromantz. That’s thirty nine square miles of roughage. Production, too, has gone beyond berries and salad mix: Earthbound grows a whole range of fruits and vegetables, and markets its own line of cookies, granola, and portable snack packs of baby carrots.

The Goodmans’ operation led directly to making the salad mix un-precious, Guthman writes. A food once largely accessible only to restaurateurs, baby greens became affordable through: the mechanization of the bagging process, invented by the Goodmans and adopted by several other growers of lettuce; the use of organically-acceptable, though contentious, Chilean nitrate fertilizer; the use of conveyer belts in the harvesting of hardier lettuces; and monoculture growing systems.

This isn’t what Howard and Rodale would have envisioned. Farms like Earthbound are organic in only the most technical sense: they follow the basic USDA guidelines. But otherwise their practices are not organic in the Howardian sense. They use only organic pesticides and fertilizers. Howard would have used none at all. Industrial organic farms grow in monocultures. Howard would ask an organic farmer to produce a cornucopia of vegetables and fruit. Industrial organics ship their produce near and far – from Chile to the United States, from Arizona to Michigan. Howard would have asked you to sell your vegetables to your neighbor. Of course, under

Howard's guidelines, your neighbor might have to survive on something like pickled cabbage and potatoes during the winter.

Still, Guthman questions the scale on which the Goodmans farm — vast monocultures of vegetables like baby greens, carrots, and peppers — and without crop rotation or Howard's vision of a closed-loop farm. She calls this "industrial organics." This kind of "organic farming," she posits, replicates the practices of conventional farming that got us into hot water to begin with: growing in large monocultures, using nitrogen fertilizers and pesticides. Sir Albert Howard would have cringed. But Earthbound lowered the price of organic salad mix from twelve dollars a pound to four, increasing its accessibility.

But if industrial-scale "organic" farms come under too much fire, how are we to produce enough organically grown food (at least according to USDA regulations) at an affordable rate to keep options like organic carrots, lettuces, radishes, tomatoes, peppers — whatever you can think of — on the shelves of non-specialty grocery stores? Organic food grown in true Howard fashion produces small amounts of food relative to the number of people even in the United States. A small amount of product coupled with large demand drives its price up. A kind of business like Earthbound produces a large amount of food that is organic according only to the USDA's standards — but it's affordable. A kind of farm like Jim Buckle's non-certified organic farm in Massachusetts produces food more or less organically, and its prices at the farm stand and through its CSA, Buckle says, are competitive with supermarket prices — but its produce can't be labeled as organic. And its production shuts down in the off-season.

I'm curious about whether our food might fare best grown under a mix of the two practices, so I ask Guthman what an ideal food system would look like. The question fails. Miserably. She laughs. "Part of the problem is we're trying to look for some sort of ideal or utopian [food system] and I just don't think that's how change works." The point is to look within our own food system and convince it away from the oppression, exploitation, and ecological destruction she says it relies on currently.

The oppression and exploitation Guthman refers to is the vulnerability of migrant laborers that farmers sometimes rely on. The question is a serious one. An article published in the 1992 edition of the *Journal of Sustainable Agriculture* examines the plight of the migrant laborer. The authors Andrea Able, Peggy Prather, and Paul B.

Martin call migrant farmworkers an “essential part of conventional U. S. agriculture.” Migrant work is essential because of the seasonality of produce: an apple farm doesn’t produce apples year round. Work is required in varying intensities depending on what time of year it is. These laborers’ “transient lifestyle” makes accessing health care, education, and a solid economic base difficult, they write. A study done in the same year by J. Edward Taylor for the American Agricultural Economics Association found that agricultural workers earn the least of any other occupation, and, in this category, illegal immigrants scrape the bottom of the bucket. In a business whose income is capricious, and whose labor requirements vary as much as farming’s needs do, migrant laborers—for both conventional and organic farms—are sometimes a cheap and alluring answer.

How we get to a food system or series of systems that might feed us equitably is difficult to imagine. “If I knew, I’d be doing it,” Guthman says. She argues against alternative food politics’ singular focus on the food. “ ‘Everybody needs to eat this way and if everybody eats this way, they’ll all love it.’ You know?” she asks, “I love organic food. I love fresh food. I’m a total foodie. So I get the aesthetic of it. But it’s become all about the food. If you give people the food, there will be equality. That’s just not the case.” Who grew the food, how they were paid for it, how the food traveled from where it was grown, and how accessible the food is for consumers of every income bracket are all of equal concern.

“It’s not,” she says, “just about letting people taste an heirloom tomato.” Some people don’t have the privilege to buy that heirloom tomato. “One of the things people lose sight of,” she continues, “is that the reason that cheap food has such salience is that so many people depend on it because their wages are so poor. It’s not enough to say, ‘you should just spend more for your food.’ For so many people, they don’t have those kinds of wages.”

“Let’s focus on what the problem is. The problem is bad chemicals. The problem is our monocrop systems. The problem is injustice. The problem is the inability of people to unionize. The problem is inequality. Let’s come up with solutions for that rather than fetishize something like alternative—as much as I love good, organic food.” The issue of figuring out a set of food systems that work, she says, is how we should approach the food system *along with* concern about oppression, concern with

exploitation, and concern with ecological destruction. We can't, she says, start from the idea of what an ideal food system would look like. "I don't know what it would be like," she says. "We have a big world."

It is unavoidable to reach this conclusion: in this country, to buy organic produce, one must have the income to do so. "I go to the farmer's market," says Patricia Norris, Michigan State professor of natural resources, "and it's more expensive to buy at the farmer's market than it is at Meijer [a regional grocery chain]. And that's ok, because I can afford it. But the bottom line is, what if there is no Meijer? What if there is no Tyson's pork on the shelf, and we all have to go to the farmer's market and buy organic, free-range pork?" Fine, she says: there will be some who can afford it, and some who won't be able to buy it. "Well, that's ok. We'll just have it there for people who can afford it. Then we'll have the yucky mass-produced stuff for people who can't. Now what are we doing? We're dividing our society into the haves and the have-nots."

Higher prices for niche market produce is a common concern among those who study the local, organic food movement. Penn State rural sociologist C. Clare Hinrichs questions what she calls "high-end, chi-chi, artisan local food systems."

"The one I often use in my teaching is the heritage tomato example in California — we're at six dollars a pound at the farmer's market. That's not an affordable tomato. It may be a delicious tomato. I'm a privileged person — I can buy that — but that's not going to work for someone of the working poor or others and so that's a food justice issue." She finishes her criticism with a question: "Is good local food only the prerogative of those with more money?"

MIT's Deborah Fitzgerald, who has made her academic career the studying of the United States' changing food system, outlines the appealing argument for processed food. Processed food, she says, is cheaper in terms of money and in terms of time. People who support organic and local food have the time and money to do so: it costs more at the register, or at the farmer's market — and it costs, time-wise, more to prepare. "It's not clear," Fitzgerald says, "how you make it possible for people who work for a living to participate in this — people who don't have time to buy coffee here and lettuce here and meat here and cheese here. They're just trying to get home, for crying out loud." She cites an example of a hypothetical working class mother who has to care for



her children. It might be problematic, too, for her to also work at a farm in exchange for her CSA food share, as rural sociologist Hinrichs suggested as a possible solution.

“Before we create a system,” Fitzgerald says, “available to only one percent of the population, we have to realize what most people can accomplish.”

She pauses in her explanation. “I can think about this because I’m not hungry.”

### **You, Me, and Everyone We Know**

I am implicated in this – the propagation of an organic food system that potentially costs too much, that ships its food too far away. I plan, as I write this, to have a lunch of organic baby greens (though not organic by Sir Albert Howard’s definition: mine were shipped to Whole Foods from California during February – and, judging by the bag’s cost, was likely produced by an industrial-scale organic farm); sprinkled with cheese from Pennsylvania; broccoli from who knows where; decidedly non-organic chicken breast; cilantro from a small grocery in Somerville, Massachusetts, which, after a month – no exaggeration – in my fridge is still suspiciously fresh; and topped with a boiled egg that was laid, as far as I know, in the refrigeration unit of Whole Foods. Most of my groceries come from Whole Foods. My neighborhood is the opposite of a food desert: the only grocery store within walking distance is Whole Foods Market, and I am limited by my lack of a vehicle (car or bicycle or horse) to groceries on my bus line or within several blocks. In this way, my neighborhood might not be a food desert, but perhaps it is a desert for those who need an economic choice for a grocery store. And so I use my graduate student loans to buy Whole Foods’ non-organic off-brand called 365 Everyday Value; most of my food, by necessity, is non-organic.

But I, like many of my interviewees, love good, fresh food, and will likely buy more sustainably-grown stuff as my income inches up. In part because I think Deborah Fitzgerald is right: we will have to switch over to a more sustainable, localized way of growing and distributing our food. Oil is a finite resource; the beating our climate has taken as a result of oil use will require us, the privileged people who used oil so recklessly, to rethink the way we live in all aspects of our lives: as people who move

around the country, around the globe, as a people who've become so mobile; as people who have relied on a system of producing food that – while it works – impacts the environment in ways it ought not.

There is no easy solution to “fix” our food system, as Julie Guthman notes. No single system will fit formulaically over California, Missouri, Indonesia, sub-Saharan Africa, Brazil, or Saskatchewan. Each climate, each area's ability to grow food, is different. Each country, each continent, has a different way of distributing food, and of supporting its farmers. And as we go hotter and drier, farming techniques will have to adapt to our change in climate.

But one thing is for certain: people will always need to eat. And as we look to reforming our food systems, we will have to find ways to get food to everyone – for the 16.3% of Americans in rural areas below the poverty line; for the 17.7% of urban Americans below the poverty line. Globally, World Bank reports, the 1.4 billion people in developing countries who live on less than \$1.25 U.S. per day, those people whose access to food is, even currently, dicey at best. Those people for whom food is a necessity and a luxury at the same time.

Organic farming has a noble attraction: an idea of farming, Julie Guthman writes, that agrarians lionize and elevate. Wendell Berry is an example of one, she says, who sees “farming and gardening as the utmost in vocations and avocations” – a philosophy that could be viewed as problematic in a country like the United States, with our tumultuous relationship with race, land, and farming. Sir Albert Howard views organic as equally philosophically fulfilling as Berry does, with its intimate connection to the consumers of its produce – farmer to consumer, person to person. And organic farming has a fundamental magnetic philosophy: to grow our food in natural symbiosis with the environment, to allow nature to operate as it always has – to figure out its own systems of pest checks and balances.

But unless organic food can be more than a niche market whose prices undermine its accessibility, then it will remain something only a select few can enjoy, appreciate, and consume.

## References

Abel, Andrew, Prather, Peggy, and Martin, Paul B. "Sustainable Agriculture and Migrant Farmworkers." *Journal of Sustainable Agriculture*, Vol. 3, Iss. 1, 1993. Vera Multi-Search. 13 Feb. 2010.

Badgley, Catherine, Jeremy Moghtader, Eileen Quintero, Emily Zakem, M. Jahi Chappell, Katia Aviles-Vasquez, Andrea Samulon and Ivette Perfecto. "Organic Agriculture and the Global Food Supply." *Renewable Agriculture and Food Systems*: 22 (2). 2007. Vera Multi-Search. 5 December 2009.

Bingen, Jim, Carol Osborne, Emily Reardon. *Organic Agriculture in Michigan – 2008 Survey Report*.

Clauson, Annette. "Despite Higher Food Prices, Percent of US Income Spent on Food Remains Constant." *AmberWaves*. United States Department of Agriculture, 2008. 15 Mar. 2010.

Fitzgerald, Deborah. "Eating and Remembering." *Agricultural History*, 79.4. JSTOR. 20 Dec. 2009.

Fitzgerald, Deborah. *Every Farm a Factory: the industrial ideal in American agriculture*. New Haven: Yale University Press, 2003.

Fromartz, Samuel. *Organic, Inc.: Natural Foods and How They Grew*. Orlando: Houghton Mifflin Harcourt, 2006.

Guthman, Julie. *Agrarian Dreams?: the paradox of organic farming in California*. Berkeley, University of California Press, 2004.

Guthman, Julie. "Can't Stomach It: How Michael Pollan et al. Make Me Want to Eat Cheetos." *Gastronomica*, Summer 2007. Vera Multi-Search. 10 Dec. 2009.

Guthman, Julie. "'If They Only Knew': Color Blindness and Universalism in California Alternative Food Institutions." *The Professional Geographer*, Vol. 60, Iss. 3, August 2008. Vera Multi-Search. 10 Dec. 2009.

Guthman, Julie. "Bringing good food to others: Investigating the subjects of alternative practice." *Cultural Geographies*, vol. 15. 2008. Vera Multi-Search. 10 Dec. 2009.

Guthman, Julie. "Fast food/organic food: reflexive tastes and the making of 'yuppie chow'" *Social and Cultural Geography*, Vol. 4, No. 1: 2003. Vera Multi-Search. 10 Dec. 2009.

Keupper, George. "Organic Farm Certification & the National Organic Program." *National Sustainable Agriculture Information Service*. National Sustainable Agriculture Information Service, 2002. Web. 13 Dec. 2009.

Lin, Brenda, Ivette Perfecto, and John Vandermeer. "Synergies between agricultural intensification and climate change could create surprising vulnerabilities for crops." *BioScience*, vol. 58, Issue. 9. October 2008. Vera Multi-Search. 15 Mar. 2009.

Nowacek, David and Rebecca S. Nowacek. "The Organic Food System: Its Discursive Achievements and Prospects." *College English*, 70.4, 2008. Vera Multi-Search. 1 Dec. 2009.

"Organic Prices." USDA Economic Research Service. USDA, 18 May 2009. 3 Feb. 2010.

Peterson, Wesley F. E. *A Billion Dollars a Day: the economics and politics of agricultural subsidies*. Chichester, U.K.; Malden, MA: Wiley-Blackwell, 2009.

Robertson, G. Philip, Scott Swinton. "Reconciling Agricultural Productivity and Environmental Integrity: a Grand Challenge for Agriculture." *Frontiers in Ecology and the Environment*. Vol. 3, Iss. 1. 2005. Vera Multi-Search. 28 Dec. 2009.

Shiva, Vandana. "The Green Revolution in the Punjab." *The Ecologist*, 21.2. Mar./Apr. 1991.

Taylor, J. Edward. "Earnings and Mobility of Legal and Illegal Immigrant Workers in Agriculture." *American Agricultural Economics Association*, 1992. Vera Multi-Search. 13 Feb. 2010.

Traub, Larry. "Per Capita Food Expenditures Declining Around the World." *Food Review* Jan-June, 1992. Vera Multi-Search. 12 Mar. 2010.

United States. Dept. of Agriculture. *Organic Foods Production Act of 1990. Title XXI of the Food, Agriculture, Conservation, and Trade Act of 1990: Organic Certification*.

"When buying organic pays (and when it doesn't)." *Consumer Reports*. Consumer Reports, Feb. 2006. 1 February 2009.

#### Sources:

Badgley, Catherine. Paleologist, Paleoecologist, University of Michigan

Bingen, Jim. Professor of Food, Community, and Agriculture, Michigan State University

Buckle, Jim. Sustainable / Organic Farmer, Allandale, MA

Guthman, Julie. Geographer, University of California, Santa Cruz

Hinrichs, C. Clare. Rural Sociologist, Penn State University

Fitzgerald, Deborah. Dean of Arts and Humanities, Agricultural Historian, MIT

Norris, Pat. Agricultural Economist, Michigan State University

Swinton, Scott. Agricultural Economist, Michigan State University

Further Interviews:

Glenna, Leland. Rural Sociologist, Penn State University

Olds, Dick. Dairy Farmer, Kingsley, MI

Thompson, Paul. Philosopher, Michigan State University