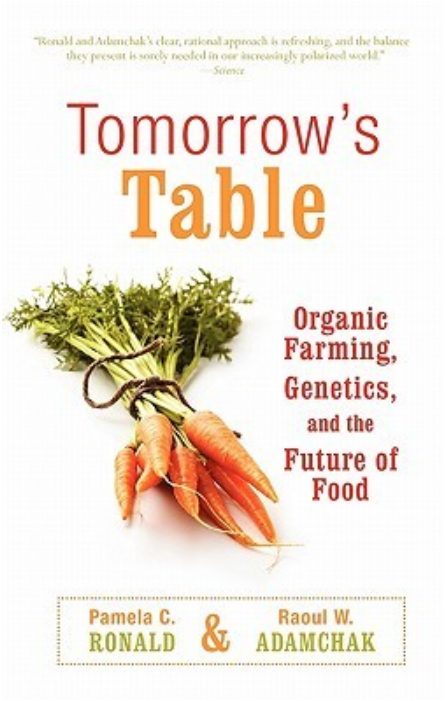

Tomorrow's Table: Organic Farming, Genetics, and the Future of Food

Pamela C. Ronald , Raoul W. Adamchak

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By the year 2050, Earth's population will double. If we continue with current farming practices, vast amounts of wilderness will be lost, millions of birds and billions of insects will die, and the public will lose billions of dollars as a consequence of environmental degradation. Clearly, there must be a better way to meet the need for increased food production.

Written as part memoir, part instruction, and part contemplation, *Tomorrow's Table* argues that a judicious blend of two important strands of agriculture--genetic engineering and organic farming--is key to helping feed the world's growing population in an ecologically balanced manner. Pamela Ronald, a geneticist, and her husband, Raoul Adamchak, an organic farmer, take the reader inside their lives for roughly a year, allowing us to look over their shoulders so that we can see what geneticists and organic farmers actually do. The reader sees the problems that farmers face, trying to provide larger yields without resorting to expensive or environmentally hazardous chemicals, a problem that will loom larger and larger as the century progresses. They learn how organic farmers and geneticists address these problems.

This book is for consumers, farmers, and policy decision makers who want to make food choices and policy that will support ecologically responsible farming practices. It is also for anyone who wants accurate information about organic farming, genetic engineering, and their potential impacts on human health and the environment.

Tomorrow's Table: Organic Farming, Genetics, and the Future of Food Details

Date	:	Published April 18th 2008 by Oxford University Press, USA
ISBN	:	9780195301755
Author	:	Pamela C. Ronald , Raoul W. Adamchak
Format	:	Hardcover 208 pages
Genre	:	Food and Drink, Food, Science, Nonfiction, Agriculture, Health

From Reader Review Tomorrow's Table: Organic Farming, Genetics, and the Future of Food for online ebook

Ed says

With the writing of this contentious book, the authors set in motion a very heated debate as to the nature of genetic engineering and its ability to be married with organic farming as the solution for truly sustainable agriculture. Pamela and Raoul are wife and husband, geneticist and organic farmer. “Tomorrow’s Table” is written as a memoir, dialogue with friends, and a textbook on organic farming and genetic engineering. Pamela, as a geneticist, works to distinguish between genetic engineering fact, fiction and myth. In the chapter entitled “Is GE Food Risky to Eat?”, she points out that the National Academy of Sciences committee determined that both the process of genetic engineering and traditional breeding pose similar risks of unintended consequences. Then she points out that mutation breeding and induced mutation pose a higher risk of unintended consequences and yet the Organic Standards allow for mutation breeding and induced mutation. Mutation breeding is where seeds are put in a highly carcinogenic solution and treated with radiation to induce random changes in the DNA. Surviving seedlings are selected for new and useful traits that are then adopted by breeders. Resulting fruits and vegetables can then be certified organic. This is just one example of many facts that many knowledgeable people are unaware of in the organic industry. The book follows through with describing what organic farming and genetic engineering is and how it works. Pamela also explains how genetic engineering can help in conserving wildlands and protecting the environment. The information is convincingly presented. Whether you agree with genetic engineering or not, this book has indispensable information for all concerned with organics and sustainable agriculture.

Drew says

One of the first things that I was reminded of by reading this book is how hard it is to farm. In addition to physically taxing work. The economic rewards are rarely enough to make it appealing from an investment standpoint. Yet the importance of growing more food for an expanding population with less pesticides on less ground has never been more obvious. The book is written from the two points of view that most people want to hear from the most, scientist and farmer. I think everyone wants to better understand the impact science has had on our food supply and those that create it. The fact that Dr. Ronald has made significant advances in the field of molecular genetics appeals to the reader who wants solid facts. The books offers a great historical account of genetic modification of crops and pesticide use, explained for the layman. The perspective of the modern farmer is something I either have not sought or not found readily available in much of todays writing. Like most everyone of medium to upper income means I consume just about any type of food I want, in the quantity and at the time of my choosing. Yet I knew remarkably little about where, how, and the drivers behind its production.

A great insight in the book is how unnecessarily confusing the debate about the science around genetically modified seeds has become. The authors lay out a good base to begin thinking about a politically charged issue again without adding in the usual rhetoric and fear mongering. I would recommend the book to friends that would be for and against GMOs. The reader that would probably benefit the most is one who wants to better understand one section of our agricultural world that has been impacted heavily by science and its future implications.

Hilary says

A must-read for anyone interested in the GMO debate or just curious about how organic farming and genetic engineering can intersect to reduce environmental impact, enhance food production, and reduce herbicide/pesticide application. This book refreshingly addresses both the benefits and pit-falls of genetic engineering and the organic movement, resulting in a well-rounded examination of both approaches.

This book touches on the details of genetic engineering in an easy-to-understand way, clearly describes its practical application, and even delves into the ethics of the debate by carefully addressing the difference between corporate interests, social implications, environmental impacts, and regulatory costs. It is rare for these distinctions to be so well articulated in the GMO debate. Distinctions are also made between to different applications of agricultural biotechnology and makes important and necessary distinctions between the various applications (viral resistant strains, flood resistant strains, herbicide resistant strains, vitamin fortified strains, etc) - important distinctions that are often overlooked or completely ignored.
Highly recommended.

As a side-note, persons unaccustomed to technical papers may find the writing a bit dry. I also could have done without the "the other guy is an idiot" anecdotes that always seem to make their way into these types of books, and the recipes seemed a little out of place (though I am tempted to try a few myself). I do not agree with Pam's endorsement of herbicide-resistant strains, since I think they lead to over-application of herbicides, of which many have been shown to have harmful effects on humans and ecosystems.

Charl(ie|es) says

"Genetic engineering is not a panacea for poverty, and more than conventional breeding is or organic practices are, yet it is a valuable tool that farmers can use to address real agricultural problems such as pests, diseases, weeds, stresses, and native habitat destruction. Like any tool, GE can be manipulated by a host of social, economic, and political forces to generate positive or negative social results."

Unfortunately the above quote isn't a good representative of the book as a whole. Instead it's almost half of conversations with the authors that are based on real life events or something with the actual good information peppered inside those conversations. I am interested if this kind of conversational writing works for some people to keep their attention in a subject. I now know it does not work for me. As other reviewers have pointed out, it also has a tone of smugness in a few parts which isn't helpful when trying to educate people.

Meri Elena says

"Ronald and Adamchak's clear, rational approach is refreshing, and the balance they present is sorely needed in our increasingly polarized world." --*Science*

This book is the NC State University common reading assignment this summer, and I was so excited to read it. I'm an environmentally conscious plant genetics major, so it's right up my alley. The two authors, an

organic farmer and a plant geneticist, are a married couple who think that organic farming techniques and GM crops are the best way to adapt agriculture to our damaged and overpopulated planet. I happen to agree, so that is inevitably part of the reason I enjoyed this book, but I'll try to be impartial.

The style is more *Silent Spring* than science journal, filled with anecdotes, personal commentary, and recipes, which struck me as strange, but cool. I might have liked a little more science and a little less autobiography, but overall I think the authors picked a good way to get their point across. The science is there--facts, studies, processes explained--and cited extensively, which is what you want to see in a book like this. Less positive was the proliferation of typos. A scientific book published by a big name outfit, and yet there's at least one mistake on every other page? On pages 148-9 I counted at least three, possibly as many as five errors. That's a fairly representative tally. *Tomorrow's Table* has two authors, was run by Pam Ronald's writing group, and surely had editors. Someone really should have paid more attention.

In summary, the authors used a good writing style, though typos abounded, and the content is fantastic. Their arguments are solid, science-based, and much-needed in today's world, where pseudo-research and bought facts rule the media. It was definitely worth a read, and I will thoroughly enjoy discussing it with my soon-to-be classmates.

Rob Best says

"Tomorrow's Table" is a very well researched account of organic farming and genetic engineering. Ronald and Adamchak do an excellent job of presenting the two topics side by side and merging them to show how prevailing trends in food science are affecting what is marketed and eaten. Most importantly, though, they provide a scientific context for two of today's most controversial and hottest buzz words in the arena of food. The only drawback to the book, in my opinion, is the storytelling style that pervades the text. While this is kept minimal at first, it grows in prevalence throughout the book and makes some of the factual arguments seem as though they are opinion or personal narrative rather than scientific research. This framing device is meant to help the reader relate to the authors and make an emotional appeal (since food is an emotional topic as it is), but the device is overused and takes away from the arguments in my opinion.

That said, the juxtaposition of organic farming and genetic engineering is fascinating. The reader really understands the underlying concepts of both movements, and how they are not necessarily mutually exclusive. Rather than just present the standard all positive and all negative sides of organic and GE, respectively, Ronald and Adamchak provide a very balanced view of each topic. The pros and cons to farmer, scientist, and consumer are all discussed. This is especially meaningful in the deliberate and researched section on genetic engineering where the traditional arguments against GE are dissected and examined through a scientific lens. Ronald does an excellent job here of separating the emotional, social, and economic arguments from the scientific and addressing each in turn.

Overall, this book is a must-read for anyone interested in food or genetic engineering. It provides a balanced perspective that explains the science of both topics and the challenges and possibilities of each. It is a refreshing change from the perspectives of these two important food issues seen in modern media.

Lena says

I first became curious about this book after reading that it was co-authored by an organic farmer and a plant geneticist who also happen to be husband and wife. Given how polarized the conversation about organic food and genetically engineered food tends to be, I hoped this book would provide me with some more balanced information on the topic than is generally available, and that is precisely what it does.

Pam Ronald works at UC Davis, where she has been using the techniques of genetic engineering to create strains of rice that can better survive flood conditions and thus lower starvation rates in places like Bangladesh. Her husband Raoul runs the university's student organic farm. They have each written chapters individually to educate readers about various aspects of their respective disciplines and conclude the book with a jointly written and compelling argument that genetically engineered, organically grown food is going to be an important tool in the fight to end world hunger and environmental degradation.

Pam starts the book with what I think is supposed to be a simple introduction to the science of plant genetics. I was a little concerned when I read this chapter since it was rather more technical than I was expecting (it includes a recipe for how to extract DNA from a strawberry). But after laying that foundation, the book becomes highly readable as it addresses the arguments against GE plants one by one.

Pam makes a compelling case that what geneticists do to modify plants in the lab today is not very different from what humans have been doing to selectively manipulate plants ever since we started domesticating them thousands of years ago. She also effectively addresses each of the safety concerns about GE plants, from concerns about the impact on human health (despite GE plants having been in wide use for over 30 years, there isn't a single documented case of health problems from them) fears about pollen drift and the unintended creation of "superweeds" (theoretically possible but exceedingly unlikely due in part to the fact that domestic crops can't survive without human tending) and questions of corporate ownership of patents and how intellectual property concerns limit the ways in which these plants can be used to alleviate hunger in the parts of the world that need them the most.

Raoul also chimes in with a candid discussion of both the benefits and very real limitations of organic farming. While there are some things organics can do very well, it will never be a complete solution to the world's food problems. His chapter on the economics of saving seed was an especially interesting contribution, as it explains why the inability to save GE seeds isn't as much of a threat as its been made out to be (in a nutshell, simple economics prevent all seed companies - organic as well as GE - from gouging farmers - if buying expensive patented seed doesn't pay for itself, farmers can use seed banks to go back to doing things the old fashioned way.)

In one of Pam's chapters, she addresses the monarch butterfly scare that was widely reported in the press a few years ago, in which butterflies were dying after consuming a GE crop. What was never reported in the press was that follow up studies demonstrated that the damage to the butterfly population from conventional pesticides currently in use was far greater than the damage that could be done from GE crops.

Herein lies one of the major arguments of the book - that, contrary to what the environmental movement claims, GE crops have astoundingly positive environmental benefits. Engineering a plant to be resistant to its most dangerous pest can dramatically reduce the amount of pesticides required to grow it. In just one example, pesticide use in the Chinese cotton crop has decreased 80% since the introduction of GE varieties.

In addition, GE may provide the only way to prevent some of our more vulnerable crops from being wiped out by a devastating viruses. The domestic papaya industry was nearly destroyed by one such virus until a resistant GE strain was created. Bananas, peaches and plums are just a few of our crops that face similar risks.

You can still buy non-GE organic papaya here because Hawaiian farmers have learned to work together to produce both. Rings of virus-resistant GE papaya have been planted as a protective barrier around the more vulnerable, organic crop. This is a good metaphor for the argument the authors make that solutions to our food and environmental problems lie not in either GE or organic, but in a thoughtful combination of the best of both.

At a time when the government's recent approval of GE alfalfa has caused what can only be described as a hysterical reaction among those who fear this is going to infringe upon their "right" to buy organic food uncontaminated by GE, I think this message is a crucial one. Those who genuinely care about the environment need to expand their perspective to include not just their own desire to buy boutique organics, but the food needs of developing nations and the environmental needs of a planet stressed by conventional farming techniques. This book is an excellent place to begin debunking the fear-mongering about GE and understanding what its risks and benefits really are.

Melody Rudenko says

Assigned this book in biotech class. I was surprised and a little disappointed by the choice, pop lit instead of hard science, but it's an easy read and basically well written. The personal anecdotes aren't really helpful and have slot of smug overtones, but if you've become used to that type of smug culture (which is becoming more pervasive where I live) the anecdotes will serve the purpose the authors intended rather that just making them come off as self-superior and out of touch. I think this book should be on your reading list if you're reading all the other popular foodie books. It brings to light an aspect of our modern food culture that is widely over looked in by the other foodie authors. For someone without good scientific understanding of genetics I would think reading this book is a good way to begin understanding modern genetic technology. But just a beginning, you need to read more to really understand the impact this technology has on our diet and the diversity (or lack of diversity) of the food products available at the supermarket.

MeganS says

Really interesting book that made me think. Fairly easy to read and engaging, and of course the authors are pushing their opinion, but supported with lots of scientific information!

Joel Finkle says

This is a slim book, designed to be neither too technical nor too political, covering many of the issues that put organic farmers at odds with genetic engineering, and softly knocking most of them down. It's unnatural? Well, conventional breeding permitted by the organic regulations permits modifying plants through radiation and mutagenic chemicals (such as Calrose rice). Foreign DNA? Would you rather be eating papaya ringspot virus in every bite of papaya? And so on. It's an entertaining read, alternating between Adamchak, an organic farmer, and Ronald, a geneticist, both at U.C. Davis (and married to each other).

It's also a cookbook -- about 8 recipes scattered throughout, one of them tongue-in-cheekily identifying which ingredients are GE.

It talks about some of the issues of ownership of genes and seedstock, but skirts some of the more sensitive issues such as a large producer (who shall remain nameless to avoid flamewars), that requires GE seed to be bought each season and not reused from grown stock. The answer is of course that researchers should be able to make money off of their inventions, but it also goes against millennia of tradition permitting farmers to re-use seeds.

Does this book solve the issues preventing organic farmers from using GMO seeds? No, but it does make it clear that it's not an us-vs-them thing, it should be a conversation.

Reading between the lines, it appears to me that most objections to GMO originate in the corporate sources, and those sources roles in Vietnam-era herbicides. There's good to be had from GMO, with risks no worse than conventional breeding, and significant improvements in yield and food security worldwide (one interesting anecdote, though: A GM wheat that had potential for more grain per acre had lower yields in practice because birds can perch on the stems and eat the grain). The book fails to draw a firm conclusion, attempting more to open the conversations that are, right now, quite closed.

Steve says

I love this book, written by a husband-wife team, about what may strike many as an unlikely marriage: genetic engineering and organic farming. The authors' marriage is equally surprising. He is a professor of organic farming, and she is an academic plant geneticist. In this book, they bring together their interests, and point out an important synergy.

That is, genetic engineering and organic agriculture need not be at odds with each other. In fact, genetic engineering can be a valuable tool to the organic farmer. Instead of spraying dangerous insecticide over a crop, killing beneficial insects and drifting on the wind to who-knows-where, insert a bacterial gene for BT into the plant, itself, making it resistant to a very selective, targeted set of pests.

BT is short for bacillus thuringiensis, a bacteria that produces a specific toxin that kills certain insects, mostly things like cabbage loopers and cotton boll weevils. It is not toxic to humans or other “higher” animals. It’s not toxic to honey bees. The dried extract of this bacteria has been applied to crops by organic farmers and gardeners for decades. However, spraying BT on crops causes some danger to non-target species, such as butterflies and moths, even those that are not agricultural pests. Organic advocates accept this limited collateral damage.

Why not use that toxin more selectively? By inserting a gene for the toxin into a crop plant, you assure that only insects that eat that plant are in peril. BT corn and cotton are poster children for this clever approach. Before BT cotton, huge amounts of toxic insecticide were sprayed on the cotton crop to combat the boll weevil. Insecticide applied to the cotton crop worldwide constituted the lion’s share of all insecticide used in agriculture.

This weevil poses a knotty problem. The adult female lays her eggs on the surface of the cotton boll, where they are vulnerable to sprays. However, the eggs soon hatch, and the larvae quickly bore into the cotton boll, where they are unreachable by sprays. Hence, farmers must spray every few days to kill the eggs before they hatch. If we incorporate BT into the tissues of the cotton plant through clever genetic engineering, the insect is killed when it begins to feed on the crop tissues.

This approach has been a huge success. Today, almost all cotton grown in the world is BT cotton, saving literally millions of tons (!) of toxic insecticide application every year. Yes, millions. This is good for the environment, good for the farmer, and good for the consumer. And this is just one example of the magic (excuse me) of genetic engineering.

Adam says

I think about agricultural ecology and human nutrition and health pretty much all the time these days, and I rarely think about genetically engineered crops. On one hand, the problems, it's not even on the radar. Simply doing agriculture is about the worst aspect of agriculture - destroying habitat for most native organisms and perpetuating that destruction every year by killing colonizing perennials and maintaining disturbance levels that exclude anybody adapted to a stable perennial ecosystem. Soil erosion, fertilizer runoff, depletion of aquifers for irrigation, and toxic pesticide use are the other big problems exported from farm fields.

And the yield sucks, too - low dietary diversity, highly vulnerable to flooding, drought, and pests, and nutrient poor foods. Whether the crops are GE varieties owned by Monsanto or just hybrid varieties owned by Monsanto is immaterial. In some situations important variables could be altered one way or another by a engineered gene - Bt corn probably did reduce insecticide use, and herbicide resistant crops probably increased herbicide use but decreased tillage. A mixed bag, not really solving the core problems with the system, but not making it appreciably worse.

On the other hand, GE seemed to offer no solutions. Crops were designed for an awful system using the shortsighted logic of the chemical arms race logic. The techniques were rarely aimed at perennial crops, and more rarely at nuts. The traits that can be expressed through genetic modification are limited and don't include complex things like increased drought resistance or adaptation to low-input, biodiverse organic systems. And how practical is it to expect the relatively few qualified labs to develop locally adapted strains of every crop for every climatic and soil zone?

A lot of that changed when I learned about the American Chestnut. The chestnut was once the staple crop of the whole eastern north American forest, feeding squirrels, passenger pigeons, native Americans, settlers, and many other species. They were essentially wiped out by an invasive fungus from China. Enough germplasm survives in a few remaining trees to supply a three-pronged effort to create blight-resistant trees. Among these is William Powell's GE program at SUNY Syracuse. The goal of all three methods is to produce a tree that is American in every respect but vulnerability to blight. Powell's current tack is to insert wheat genes that code for an enzyme that defuses the fungus' acid attack. And his method has thus far yielded better results than the other two programs. If the American Chestnut could be revived, it would be the perfect centerpiece of a forest-based restoration agriculture program. Despite the fact that its GMO status would prevent it from being certified organic, it would be by far the most environmentally beneficial food production system in use in the country.

So now I had a reason to think the techniques of GE had a role to play in restoration agriculture, and in the beautiful synchronicity of ideas and learning, my friend Alex put this book in front of me when I was most interested and open to it. I was excited to think about other ways in which GE could aid my goals, making it the ally of organic farming instead of its opposite.

Unfortunately, the book doesn't even try to go in that direction. It's actually kind of unclear what the goal of the book is. Its most salient aim seems to be using facts, stories, and the symbolically cheerful relationship between Raoul and Pamela to educate hidebound ideological readers who kneejerk-oppose GMOs in food (I once saw someone blame GMOs for the rise in gluten intolerance, despite the fact that there are no commercial GE varieties of wheat). They explain how GMOs work, how they are more precise but in most cases not qualitatively different than traditional breeding (moving genes from one variety of rice, chicken, tomato to another), and how the scientific evidence has shown no negative health impacts. Further, how there isn't really any logical speculative negative impact.

If the hopeful audience is rigidly anti-GMO organic consumers, then it's unclear why Raoul must spend so much time detailing why organic practices are important. As far as I could tell, it's because they need to show they're still on our side. Some of the facts in here might make you think they're Monsanto propaganda employees or something - "RoundUp is less toxic than table salt" - if that's the case, why doesn't Raoul use it? Or, conversely, why does he use table salt? The other reason for this section is to show that the problems organic agriculture addresses have little to do with GMOs.

I am sympathetic to their agenda - I find uninformed reactionaries of any stripe annoying, and even more so when they make me look bad - but since the book wasn't really meant for me, it was kind of disappointing. I did get some interesting perspective shifts out of it, including a better sense of just exactly how safe GE crops have been proven to be, how much difference it makes who is setting agendas for the technology's uses (ie, private v. public sector), how GE can accomplish the goals of traditional breeding with much greater precision, efficiency, and speed, and how much the patent debate also applies to organic and open-pollinated seed (I actually had no idea these were patent-protected at all, naively). All of these things were valuable.

I did wish that some other things had been explored, though, living up to what I imagined the book to be before I read it.

1. What potential is there to actually integrate GE crops into organic agriculture, solving its unique problems? What would that synthesis actually look like? Give some creative examples, other than just "resistance to this one disease."

2. If there are practical problems in this effort, discuss them. Is it, for instance, impractical to expect GE labs to help develop or even modify locally adapted genotypes of many crop plants in many production areas?

3. Discuss what would have to take place for that to happen, since at the moment GMOs are banned in organic production and consumers are becoming much more resistant to the concept.

4. What about animals? A GMO chicken appears in an anecdote at the end of the book, but otherwise they aren't mentioned at all.

5. What of modifying pest and disease organisms, like the Florida mosquito proposal?

5. Damn Monsanto et al. more. There was some light mention of how GMOs are made to look bad by evil corporations, but a lot of this was put into other peoples' mouths and tempered.

S. says

These two authors are not professional writers, and it shows. And despite this I'm giving the book 5 stars. Because at the end of the day they manage to take the complexities of food production and bioengineering and communicate pragmatically, passionately and most importantly accurately. Yes there are times when the maxim "show don't tell" is executed with far less skill than I would like in a book. But I forgive the writers for the occasional stilted dialogue or overly florid description. Because I have read plenty of books on these topics by skilled journalists (Michael Pollen for example), who may be better writers, but ultimately get the science confused and mangled. Worse they are far too prone to ignore information that does not fit their preconceived narratives, and in doing so they fail to give a complete picture that tells their largely privileged audiences what they need to know. Journalists like Pollen instead tell his audience what they want to hear. When it comes to food production we need more scientists and more farmers talking, and writing passionately about what they know, and I'm more than willing to sift through a little mediocre writing to get their point of view on such an important topic.
And what a fantastically educational and thoughtful source this is. Before you sign that next antiGMO petition, or go to the polls about a labeling law, you need to read this book. You owe it to yourself to be informed, and Pam and Raoul have the unique perspectives of an organic farmer and a biologist that deserve to be heard.

Linda says

Tomorrow's Table is an interesting book written by a couple, Pamela is a pro-GMO university plant geneticist and Raoul is an organic farming university professor. I liked their approach to combining GMOs with sustainable agriculture practices.

Matt says

This is an important book, that I highly recommend folks check out. In the context of the upcoming vote on Prop 37, I wanted to gather further information about genetically engineered (GE) crops. Typically, we are presented with the choice between Organic farming vs. GE crops. This book is written by a husband and wife team. He is a leading organic farmer, running the student farm at UC Davis, focusing on sustainable agriculture. She is a plant geneticist working to improve the nutrition, health, and productivity of rice and other crops.

Together they catalog how each is using their practice to minimize environmental impact, and provide the best flavor, nutrition, and human benefits in the food they grow. The book is accessible and beautifully written, with lots of family recipes leveraging local, organic, and GE ingredients.

It is highly informative about the real science around GE crops, and also calls out 'big agribusiness' (especially Monsanto!) for their negative uses of GE that have caused so many people to have a bad view of this useful, beneficial technology. Highly recommended!