

Ce site utilise des cookies provenant de Google afin de fournir ses services, personnaliser les annonces et analyser le trafic. Les informations relatives à votre utilisation du site sont partagées avec Google. En acceptant ce site, vous acceptez l'utilisation des cookies.

EN SAVOIR PLUS OK!

On this web log I explore topics related to genetics, food and farming.

M O N D A Y , N O V E M B

## Blogging from Bangladesh, Part 1 of 7



This is the first in a series of 7 posts from Bangladesh and India.

Saturday, 01 November 2008

Bangladesh is a land of rivers. I can see that from my airplane window as we fly into Dhaka. The waters flow into the Bay of Bengal, along seemingly orderly channels. The riverbanks and small low-lying islands are planted to rice.

Upon landing our group (scientists, breeders, writers and photographers) make our way through the crowded parking lot to find our limousine. The cars line up bumper to bumper; the drivers blowing their horns every few seconds to encourage the beggars, mostly young barefooted boys, to move aside. One boy sleeps soundly on the pavement.

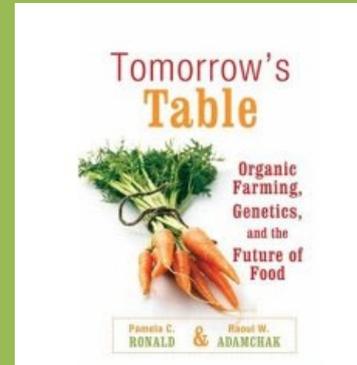
One hundred and fifty million people live in Bangladesh, in a geographic area the size of Wisconsin.

After checking into hotel Laurel (certainly nothing like the Mayflower hotel in Washington DC where my husband I stayed last week), we squeeze back into the vehicles and drive to our first meeting at Dhaka University.

Built in 1921 by the British, Dhaka University is the main research and teaching center in the country. The edges of the dirty, worn stairs are hand painted with colorful flowers. I wonder if enthusiastic students did the work on a day where they had some spare time, perhaps during a power outage that are frequent here.

Our host, and the leader of the laboratory, Zeba I. Seraj, introduces us to her 10 students who have waited until late in the day (our plane was delayed for 2 hours) to meet us. We walk through the hallways where the AC whirrs loudly in an attempt to cool the building. Because the outside air moves in through gaps in the wall, it is still hot.

## Tomorrow's Table



"Here's a persuasive case that, far from contradictory, the merging of genetic engineering and organic farming offers our best shot at truly sustainable agriculture"--Stewart Brand, creator of the Whole Earth Catalog

## Tomorrow's Table

We found the book insightful and well-documented." --  
[Organic Gardening Magazine](#)

[Read Description](#)

[Read Reviews](#)

ORDER here from [Amazon.com](#)

Reporters, producers, reviewers who would like to receive a review copy or set up an interview with Pam or Raoul should contact [christian.purdy@oup.com](mailto:christian.purdy@oup.com)

[Ronald/Adamchak Speaking Schedule and Recent Appearances](#)

## Pamela Ronald's biography



 [Pamela Ronald](#)

Pamela Ronald is Professor of Plant Pathology and Chair of the Plant Genomics Program at the University of California, Davis, where she studies the role that genes play in a plant's response to its environment. Send messages to [pcronald@ucdavis.edu](mailto:pcronald@ucdavis.edu)

 [View my complete profile](#)

## More on Ronald Research

 [The future of food may depend on an unlikely](#)



The room where we meet the students is beautiful; every foot of wall is covered with 100-year old wooden cabinets filled with biology books and journals. I imagine that this room is filled with young hardworking students during the day anxious to learn what is before them and perhaps relieved to escape the hot ill-equipped labs for a short while.

Zeba tells us that salinity is a problem for rice farmers here. Not only is the sea water rising, but fresh water supplies are under pressure partly because farmers are pumping more every year and also because Bangladesh is downstream from India, who gets first dibs on the fresh water through a network of dams. The result is that every year the saline lands encroach north, hurting rice yields, a serious problem here where the average Bengali receives 2/3 of their diet from rice. And then there are floods that arrive unpredictably, sometimes wiping out the entire crop.



Zeba and her students are working to develop salt tolerant rice. They have had success in

identifying a chromosomal regions from local landraces that confer salt tolerance to the rice. They are now trying to introduce those regions into higher-yielding varieties. They have also had some success with a genetic engineering approach. She shows us a dramatic picture of their newly developed transgenic lines thriving under high salt concentrations that kill the conventional variety. Zeba's group is now testing to see how the transgenic lines yield under normal growing conditions.

Read Part 2 [here](#).

Posted by [Pamela Ronald](#) at [7:39 PM](#)

Labels: [Bangladesh](#), [Sub1](#)

#### 4 comments:



[tanim-butpar](#) said...  
ur writing has beautiful empathy  
cheers :-)

[November 11, 2008 at 3:26 AM](#)



[Pamela Ronald](#) said...  
I am glad you enjoyed it!

[November 11, 2008 at 9:25 AM](#)

[marriage: organic farmers and genetic engineering](#)

- [Pam's Facebook page](#)
- [About Pamela Ronald](#)
- [Press reports about Ronald research](#)
- [Ronald Laboratory website](#)
- [Ronald books and articles](#)

#### Video interviews: The importance of writing to a scientific career

In this short [interview](#), Ronald and other UC Davis faculty talk about the importance of writing to a science career

#### Followers



00035630

#### Subscribe To Tomorrow's Table

- Posts
- Comments

#### statistics

#### pam's shared items

#### My Blog List

- [Scientific American](#)  
Brave New Wool? Artificial Womb Sustains Premature Lambs for Weeks  
*18 minutes ago*
- [TEDTalks \(video\)](#)  
Science in service to the public good | Siddhartha Roy  
*2 hours ago*
- [National Geographic News](#)  
10 Things You (Probably) Didn't Know About Einstein  
*13 hours ago*
- [News at Nature - Articles published](#)

Anonymous said...

Hello Pamela, we're Fundación Antama, a cabinet of biotecnologic information from Spain ([www.antama.es](http://www.antama.es)). we love your book (Tomorrow's Table), we would like to do an interview to yourself. If you like to do it, please email ourselves: [rhernandez@fundacion-antama.org](mailto:rhernandez@fundacion-antama.org) Thaks a lot for your time.

November 12, 2008 at 1:51 AM



Pamela Ronald said...

Hello fundacion Antama,

I would be glad to talk with you about the book. Your email bounced back so please contact me directly at [pcronald@ucdavis.edu](mailto:pcronald@ucdavis.edu)

November 12, 2008 at 3:02 AM

[Post a Comment](#)

### Links to this post

[Create a Link](#)

[Newer Post](#)

[Home](#)

[Older Post](#)

Subscribe to: [Post Comments \(Atom\)](#)

## Reviews of Tomorrow's Table

### --Stewart Brand, creator of the Whole Earth Catalog

"Here's a persuasive case that, far from contradictory, the merging of genetic engineering and organic farming offers our best shot at truly sustainable agriculture. I've seen no better introduction to the ground truth of genetically engineered crops and the promising directions this 'appropriate technology' is heading."

### Michael Pollan, author of *In Defense of Food and The Omnivore's Dilemma*

"Whether you ultimately agree with it or not, Tomorrow's Table bring a fresh approach to the debate over transgenic crops."--

### L. Val Giddings, President, PrometheusAB

"Welcome as water in the desert-at a time when partisans compete to see who can deliver the hardest slam against those who think differently, what a welcome surprise to find this book building bridges between unnecessary antagonists. The developers of crops improved through biotechnology and the practitioners of organic agriculture want the same thing-a way to grow food that helps farmers tread more gently on the land. Ronald and Adamchak explain how simpatico these two approaches are at heart. For a future that will bring unprecedented challenges we will need all the tools we can muster. Tomorrow's Table shows how organic and biotech can coexist and complement one another. Bravo, and bring on Volume II."--

### Peter H. Raven, President, Missouri Botanical Garden

"A unique, personal perspective on the ways in which genetically enhanced crops can improve wholesome agricultural productivity, helping to achieve the low chemical inputs that are the goal of organic agriculture and of those who care about our environment and health. Highly recommended."--

### -Sir Gordon Conway KCMG FRS, Professor of International Development, Centre for Environmental Policy, Imperial College, London, and past President of the Rockefeller Foundation, from his foreword

"This book is a tale of two marriages. The first is that of Raoul and Pam, the authors, and is a tale of the passions of an organic farmer and a plant genetic scientist. The second is the potential marriage of two technologies-organic agriculture and genetic engineering. ... Like all good marriages, both include shared values, lively tensions, and reinvigorating complementarities. [The authors] share a strong sense

### Today

Dog family tree reveals hidden history of canine diversity  
17 hours ago

### PLoS Biology: New Articles

The School Malaise Trap Program: Coupling educational outreach with scientific discovery  
20 hours ago

### Sciencebase Science Blog

Barn swallow - *Hirundo rustica*  
21 hours ago

### The Long Now Blog

How Hard Would It Be To Restart Civilization From Scratch?  
21 hours ago

### GMO Pundit a.k.a. David Tribe

The Blank Slate Rises Again.  
1 day ago

### LabLit.com latest articles

Bee scandal: Fiction as environmental lobbying  
3 days ago

### Biofortified

March for Science with Biology Fortified!  
3 days ago

### Nature Podcast

Backchat: April 2017  
4 days ago

### Online Journalism Blog

5 ways journalists can use Nuzzle with Twitter lists  
2 weeks ago

### The Tree of Life

My one day campaign for US Senate running against my brother @senatorphd  
3 weeks ago

### Quintessence of Dust

A mystery gene in human brain development: discovering ARHGAP11b  
1 month ago

### Center for Science In The Public Interest

Major Brewers to Disclose Calories and More on Beer  
9 months ago

### Gristmill

Sump Pump Liner  
10 months ago

### GMO Africa

Erkek Arkadaş Konusunda Hareketli Alanyalı Nurhan  
11 months ago

### Switchboard, from NRDC > Nathanael Greene's Blog

U.S. Clean Energy Market Hits \$200 Billion, Global Market \$1.35 Trillion, Thanks to Smart Gov't Policies  
1 year ago

### The DNA Network

of both the wonder of the natural world and how, if treated with respect and carefully managed, it can remain a source of inspiration and provision of our daily needs." -

### Booklist, April 1, 2008

With the world's population projected to grow some 50 percent by mid-century, rigorous agricultural planning becomes indispensable to forestall the onset of ecological and human disaster. Ronald and Adamchak, a wife-husband team from the University of California at Davis, combine the training and insights of a geneticist and the know-how of a committed organic farmer. They examine the often-passionate debate about genetically engineered food and how it may affect the food supply of the future, meticulously dissecting arguments for and against such application of science. This wildly eccentric book juxtaposes deep scientific analysis of genetically engineered agriculture with recipes for such homey kitchen staples as cornbread and chocolate chip cookies. In a marvelously useful table, they outline a history of biological technology from 4000 BC through the dawn of the twenty-first century. A glossary of agricultural genetics and an extensive bibliography supplement the text. —Mark Knoblauch

### Seed Magazine

Genetically-engineered versus organically-grown. It's a choice often framed as being between science and nature, but it's a false one, says this wife-husband team. In a literal marriage of two entrenched camps, Ronald, a plant genomics researcher at UC Davis, and Adamchak, an organic gardener, shed light on the unfounded fears of gene modification and the merits a more-holistic approach to agriculture. Recipes include "Sticky Rice with GE Papaya" and "Isolation of DNA from Organically-Grown Strawberries." -

### The Sacramento News & Review

Opposites attract  
By Kate Washington

At first glance, the relationship between organic food farming and genetic engineering might seem adversarial. Certainly, we'd expect proponents of the former to be hostile to the latter. But it ain't necessarily so—or so goes the argument of Tomorrow's Table, a new book by Davis residents Pamela C. Ronald and Raoul W. Adamchak.

On an anecdotal level, they seem to be living proof that the two can be paired: Ronald is a professor in the department of plant pathology at UC Davis whose research focuses on genetically engineering rice for disease resistance; Adamchak is an organic farmer, formerly of the celebrated Full Belly Farm and now at UC Davis' certified organic farm; and the two are married, so clearly, some proponents of these seemingly very different approaches to food production can get along.

Ronald and Adamchak's thesis will no doubt be controversial, but it makes good sense. They contend that genetically engineering certain plants for certain traits—resistance to pests, for instance—is one way to improve farming and food-production methods without relying on the enormous amounts of fertilizers and pesticides currently being pumped into fields. As the authors point out, the world's population is growing fast, and supporting it through environmentally sustainable farming will require some new ideas. One of which, they say, can be the wedding of genetic engineering and organics—concepts that aren't as black and white, or as diametrically opposed, as many assume.

The advocacy is balanced, though frequently impassioned, and chapters cover the nature of organics and GE, respectively; how GE is done, technically; whether GE food poses special risks (adducing GE food that has been consumed safely for years, such as papaya); conservation; the problem of weeds; and the problems of seed and gene ownership, proposing some innovative solutions to keep new varieties in the public domain. The book ends with a chapter,

Cheap Verizon Wireless Cell Phones  
1 year ago

➤ **Seed Magazine**  
Best Mobile Phone Companies in the United States  
2 years ago

➤ **Science and Evolution**  
The Ebola Virus  
2 years ago

➤ **Biotechnology: Basta Bugie!**  
Un saluto a Francesco Sala: difensore delle banali ovvietà della scienza  
5 years ago

➤ **The Fruit Blog**  
Jackfruit article grumblings...  
5 years ago

➤ **Genetic Maize - Navigating the maze of GMOs**  
Wanted: Hot plant biology blogs  
6 years ago

➤ **Women in Science**  
Scientiae Carnival @ A Lady Scientist  
7 years ago

➤ **Tomorrow's Table**  
Tomorrow's Table moves to Science Blogs  
7 years ago

➤ **Peer Review on Science Blogs**

➤ **The Inoculated Mind**

➤ **Pharyngula**

➤ **Agricultural Biodiversity Weblog**

➤ **The Loom**

➤ **Evolving Thoughts**

➤ **GMObelus**

➤ **Wikio Blogs - sciences**

➤ **Extreme Biology**

➤ **John Hawks weblog**

➤ **What's New in Life Science Research**

➤ **The Long Now Foundation**

➤ **Nature Network consolidated feed**

➤ **A Blog Around The Clock**

➤ **The Pop!Tech Blog**

➤ **ScienceBlogs : Combined Feed**

➤ **Nature Network Blogs**

➤ **Olivia Judson**

➤  **Salon: How the World Works**

"Deconstructing Dinner," that seems partially inspired by Michael Pollan's approach in *The Omnivore's Dilemma*, tracing the origin of a dinner eaten by Ronald and Adamchak's family—complete with some delicious-sounding recipes, like a plum kuchen. Local readers may also take special enjoyment in picking out references to regional foods and farmers.

The book's unusual format—the two authors switch off chapters and range stylistically from personal anecdote to hard science—makes for a lively read, even through some fairly dry and technical material. (The one seriously awkward part of the writing is the stilted nature of recalled "conversations" transcribed for the book—many are rather obviously reconstructed, and they break the flow.) Along the way, you can even find out how to isolate DNA from a strawberry at home—assuming you have a zip-lock bag, an organic berry and some ice-cold ethanol lying around.

Some of the most powerful parts of *Tomorrow's Table* are also the most personal—even aside from the simple example of the authors' marriage. In a discussion of the risk of GE foods, for instance, Ronald describes how assiduously she avoided risky foods when pregnant with her first child—and then reveals, painfully, that their son was stillborn because of an unpreventable umbilical-cord accident. It's an associative style of argumentation, to be sure, but no less affecting for it as an example of how "all the essentials of life—food, family, and work—have associated risks," Ronald writes, continuing, "In the end, we can only gather the most accurate information from reliable sources and make the best choices possible. I know the GE crops currently on the market are no more risky to eat than the rest of the food in our refrigerator." Adamchak's farming experiences are similarly rendered with immediacy and verve; the hard work of clearing weeds and battling pests comes through clearly and we see why he (and other farmers) might wish to explore technologies that improve organic farming.

Such arguments, as Ronald herself admits in other sections of the book, may not convince die-hard anti-GE types. But this book, with its fresh and intriguing premise, its unconventional style and its passion for improving farming and food production, is worth reading with an open mind.

**"If you care about food, you would be well-served by reading *Tomorrow's Table*"**

**Karl Mogel, geneticist, blogger, radio show host and journalist, has just posted [a review of \*Tomorrow's Table\*](#).**

Here is teaser from the review:

"The chapter on politics... begins with a grisly scene..." Read on

While I was in the process of applying for graduate school, in late 2006, I was chasing down a letter of recommendation from my former boss, and somehow, the conversation turned to a book he was asked to proof-read. That book, a year and a half later, was to be published as *Tomorrow's Table: Organic Farming and the Future of Food*, by Pamela Ronald and Raoul W. Adamchak. Pamela Ronald is a rice geneticist and genetic engineer, the chair of the plant genomics program at UC Davis, now also the Director of Grass Genetics at the Joint Bioenergy Research Institute in Emeryville. (She is also a former professor of mine.) The second author, Raoul, is an organic farmer, who runs the UC Davis Student Farm's Market Garden, a stone's throw from where I used to garden in Davis.

When I first heard about it in production, I couldn't wait to read this book, because I knew what it would be about, an idea that both Pam and Raoul have promoted and embody in their lives. You see, Pam and Raoul are married, and they think Organic Agriculture and Genetic Engineering should be, too.

*Tomorrow's Table* opens with a concise explanation of relevant concepts, to get everyone on board the same train. For those who are not familiar with plant breeding, genetic engineering, or what the differences are between organic and conventional agriculture. With a

## DNA network

## Submit this page to slashdot

Add to ">slashdot

## technorati favorite

## Subscribe Now: Feed Icon



[Subscribe in a reader](#)



## Blog Archive

- ▶ 2009 (19)
- ▼ 2008 (71)
  - December (2)
  - November (12)
  - October (4)
  - September (12)
  - August (7)
  - July (7)
  - June (9)
  - May (7)
  - April (11)

## Labels

- ▶ [award](#) (1)
- ▶ [Bangladesh](#) (7)
- ▶ [biology](#) (1)
- ▶ [biotech](#) (7)
- ▶ [blogging](#) (2)
- ▶ [book review](#) (1)
- ▶ [boston](#) (1)
- ▶ [breeding](#) (3)
- ▶ [climate](#) (1)
- ▶ [climate change](#) (1)
- ▶ [collaboration](#) (1)
- ▶ [conservation](#) (2)
- ▶ [conventional](#) (2)
- ▶ [creationism](#) (2)
- ▶ [education](#) (2)
- ▶ [energy](#) (1)
- ▶ [engue](#) (1)
- ▶ [farming](#) (7)
- ▶ [flora](#) (1)
- ▶ [food](#) (6)
- ▶ [ge corn](#) (1)
- ▶ [Genetic engineering](#) (10)

forward by Sir Gordon Conway, they are ready to demonstrate to the reader that the political lines as currently drawn, that keep genetically engineered crops out of organic agriculture, are not only arbitrary but may be keeping us from realizing truly sustainable agriculture. Their strategy is to take turns at the dinner table - sometimes literally - to lay it all out.

Alternating with each chapter, Pam teaches a course on genetics, explaining and comparing plant breeding and genetic engineering, while Raoul takes you onto the farm and describes how the organic folks do things differently. An analogy emerges in the book, although not explicitly stated, between Raoul's trusty pocketknife and Pam's restriction enzymes - molecular scissors that are used to snip DNA into pieces to be stitched together. How does the scale of the cutting tool determine whether or not you can use it in an organic system?

Next, Pam delves into many of the issues surrounding genetic engineering: Safety, regulations, politics, and how to figure out what is true or not. Does the information come from a trusted source such as a peer-reviewed scientific journal, or a biotech company or an activist group? Are the fearful warnings about ' Frankenfood ' destroying the planet likely to be true or instead false alarms? Pam brings in the research of a sociologist who found that the source of the warnings are a very good predictor of whether or not they are true or false. Not to give it all away, but the warning's aren't exactly coming from the most reliable sources.

The chapter on politics, I might add, begins with a grisly scene: my home county of Sonoma, CA, embroiled in an anti-GE measure, proposition M. Farms and houses were littered with Yes and No on M, which would have made it illegal to grow or sell GE crops in the county. The most wide-sweeping measure of its kind in the country, it even, accidentally, would have banned medicines based on genetic engineering. Fortunately, it failed.

Next, they plow through each of the classic issues brought up in discussions of genetic engineering. Trust, risks, the environment, gene flow, and seed and genetic ownership. It turns out that GE does not conflict with the regular practices and goals of organic agriculture today, and the distinction is merely political (and social). They end with a Pollan-esque deconstruction of their food choices.

Without a doubt, this is one of the most informed books I have read on the topic of genetic engineering in agriculture, which neither overblows nor undercuts the significance of its achievements and promise, and they recognize that GE has issues ahead of it when it comes to intellectual property and consumer acceptance. On organic agriculture as well, they are well-measured in their enthusiasm for a more biological method of growing food, which can reduce the need for agricultural inputs like pesticides and fertilizers, but still has many challenges ahead of it. Garden of Eden it is not... yet. Many GE traits such as drought tolerance, enhanced nitrogen uptake, pest resistance, and disease resistance would work beautifully in an organic agricultural system of agriculture

Most of the critics of genetic engineering have ties to the organic sector of food production in one way or another, and I often hear people enthusiastic about genetic engineering who sneer about organic's small, yet growing acreage. The animosity between the two camps hurts both efforts, especially because they are often working toward the same goal - sustainable agriculture that you can sink your teeth into. For this reason every critic, skeptic, cynic, advocate, or eavesdropper of either genetic engineering or organic agriculture issues, should check out this book. It is written for them. Heck, it should be read by any person who wants to be able to have a full meal of delicious, healthy food 20 years from now. If you care about food, you would be well-served by reading Tomorrow's Table. Literally.

You will be well served by their unique style of bringing the genetics and diversity of food right to your dinner table - because they also included their favorite recipes. Enjoy "Waxy" mutant rice, which Thai restaurateurs know as sticky rice, along with GE papaya and sweet coconut sauce. Or how about corn bread made with GE canola oil and corn meal, and buttermilk? Delicious!

- [genetics and society](#) (1)
- [germline gene therapy](#) (1)
- [hunger](#) (3)
- [labelling](#) (1)
- [obama](#) (1)
- [organic](#) (7)
- [papaya](#) (1)
- [public acceptance](#) (4)
- [Rachel Carson](#) (1)
- [review of tomorrow's table](#) (5)
- [rice](#) (1)
- [sas20](#) (1)
- [SAS20 debate](#) (1)
- [science](#) (1)
- [science and society](#) (1)
- [Sub1](#) (7)
- [submergence](#) (1)
- [systems](#) (1)
- [tahoe](#) (1)
- [teaching](#) (1)
- [union of concerned scientists](#) (1)
- [writing](#) (1)



## Links and Blogs

- [Saturday Morning Science](#)
- [Egghead](#)
- [Silent Killer: The unfinished campaign against world hunger](#)
- [Silent Killer: The unfinished campaign against world hunger](#)
- [Science Books by Phillip Manning](#)
- [National Association of Science Writers](#)
- [Northern California Science Writers](#)
- [Evolution: 24 myths and misconceptions](#)
- [UC biotech](#)
- [Freeman Dyson](#)
- [The-DNA-Network](#)
- [Stewart Brand](#)
- [Edge](#)
- [Michael Pollan](#)
- [Paarlberg's Starved for Science](#)

By including recipes in a book about food issues, they are connecting their tastes in food to the reader, especially their tastes in the genetics and growing methods behind the food that Raoul and Pam choose to eat and feed to their children. They start and end with the question of what kind of agriculture we want, and the answer is emphatically and convincingly, this one.

And stay tuned for an interview with Pam and Raoul on the Mindcast!

**The Davis Food Coop, our local grocery store, has come out with a [review of Tomorrow's Table](#).**

Here is our response to the review:

A local, fresh perspective on genetic engineering and organic farming

Our existing agricultural system, while productive, has serious problems that negatively effect the environment and it's inhabitants. These problems are caused by the overuse of pesticides, synthetic fertilizers, and farming practices that lead to soil erosion. A major goal of sustainable agriculture is to greatly reduce or eliminate these problems while maintaining yields and farm incomes. In our book, *Tomorrow's Table: Organic Farming, Genetics, and the Future of Food*, we suggest a few essential ideas to help forge a more sustainable agriculture. We advocate adopting technologies or farming practices that:

- Produce abundant, safe and nutritious food
- Reduce harmful environmental inputs
- Provide healthful conditions for farm workers
- Protect the genetic make-up of native species
- Enhance crop genetic diversity
- Foster soil fertility
- Improve the lives of the poor and malnourished
- Maintain the economic viability of farmers and rural communities

Not surprisingly, given our expertise, we believe that organic farming and genetic engineering each have something to contribute to a sustainable agriculture. Rather than embracing "GE crops as the unqualified answer" as Miller states in her review of our book, we advocate that each new approach be evaluated on a case-by-case basis in light of these criteria.

An appropriate technology for food and farming, as asserted by the economist Schumacher in his book *Small is Beautiful*, should promote health, beauty, and permanence. It should be low cost and low maintenance. Considering Schumacher's ideas and our goals for ecological farming, it is apparent that GE will sometimes be appropriate for crop production and sometimes not. This is because GE is simply a tool that can be applied to a multitude of uses, depending on the needs of farmers, and consumers.

Still, as we attempt to show in our book, GE comprises many of the properties advocated by Schumacher. It is a relatively simple technology that scientists in most countries, including many developing countries, have perfected. The product of GE technology, a seed, requires no extra maintenance or additional farming skills. GE seeds can be saved and then passed down from generation to generation and improved along the way. It is therefore clear that humans will likely reap many significant and life-saving benefits from GE. This is because even incremental increases in the nutritional content, disease resistance, yield, or stress tolerance of crops can go a long way to enhancing the health and well-being of farmers and their families. Applications of GE have already been used to reduce the adverse environmental effects of farming and enable farmers to produce and sell more food locally.

For example, when small-scale papaya farmers in Hawaii were confronted with a devastating viral disease, GE papaya was the most appropriate approach (funded by non-profit sources and distributed free to growers) to restore the industry. There were no conventional or organic methods to control the disease then, nor are there now.

GE crops in combination with organic techniques have already helped

**Ronald and Adamchak talk about "Tomorrow's Table"**

**Upcoming Talks**

**[Tasting Histories; Food and Drink through the Ages](#), UC Davis (March 01)**

**[Princeton, Woodrow Wilson School of Policy](#) (April 28)**

**[Seed Biotechnology symposium](#), UC Davis (May 11-12)**

**[Telluride Mountain Film Festival](#) (May 22)**

**Lake County Farm Bureau (TBA)**

**[Reed College centennial celebration](#), San Francisco (April 15)**

**[University of Rome](#) (June 23)**

**[6th World Conference of Science Journalists](#), Stories that matter to a changing world, London (7/1)**

**[Xanthomonas Genomics Conference](#), Pingree, Colorado (7/13-15)**

**[John Innes Center](#), Norwich, UK (6/26)**

**[9th International Congress of](#)**

farmers in less developed countries. For example flooding is a major problem for millions of farmers that live on less than a dollar a day in Bangladesh, and India. Yet for over 50 years, breeders were unsuccessful in developing flood-resistant rice using conventional breeding. Today, using advanced genetic techniques, we (Pam and her colleagues) have been able to produce such a variety that has been embraced by growers because of its 2-5 fold higher yield in flood zones. Scientists predict that the lives of thousands of children dying from vitamin-A deficiency will be saved once GE rice fortified with precursors to vitamin A (so-called "Golden Rice") is released in 2011.

The best way to determine if practices are effective is through scientific study and peer review. Trying to evaluate agricultural technology without peer-reviewed science is like trying to determine if there are weapons of mass destruction in Iraq without inspections. When scientific information is available, we should use it. For example we now know that the introduction of GE cotton has dramatically reduced the use of insecticides in the US and abroad. In fields where the GE cotton is not used, the scientific data on the effects of chemical insecticides on insect biodiversity are unequivocal; they devastate local populations.

In regards to eating GE foods currently on the market, the overall issue is health. We would be quite concerned if genes in GE crops could harm people. But this is not the case. There is broad scientific consensus that the GE crops on the market are safe to eat. Over the last 15 years, 1 billion acres have been planted and not a single instance of harm to human health or the environment has been documented. In contrast, each year tens of thousands of people are poisoned by pesticides.

Agricultural advances need to be shared globally. The oft-repeated idea that because we have an abundance of food to eat in the US (thanks to good soils and abundant water and advances made by geneticists, farmers and breeders), we don't need to continue to improve crops in other countries is short-sighted. It doesn't make sense for the US to grow food and ship it to Africa or S. Asia where people cannot afford to buy it. Plus it takes precious energy to move it. Farmers in less developed countries need their own local production, improved seed, farming practices and sound government policies. That way they can feed themselves, just as we do here.

Pitting genetic engineering and organic farming against each other only prevents the transformative changes needed on our farms. Rather than opposing all applications of a particular technology, lets direct the technology to help forge a sustainable agriculture. In the words Rachel Carson, author of Silent Spring (1962):

"A truly extraordinary variety of alternatives to the chemical control of insects is available. Some are already in use and have achieved brilliant success. Others are in the stage of laboratory testing. Still others are little more than ideas in the minds of imaginative scientists, waiting for the opportunity to put them to the test. All have this in common: they are biological solutions, based on understanding of the living organisms they seek to control, and of the whole fabric of life to which these organisms belong. Specialists representing various areas of the vast field of biology are contributing—entomologists, pathologists, geneticists, physiologists, biochemists, ecologists—all pouring their knowledge and their creative inspirations into the formation of a new science of biotic controls."

Pam and Raoul, Davis Food Coop shareholders since 1980

"Tomorrow's Table" is now available in the coop. To view peer-reviewed citations, learn more about GE and organic farming, to see other reviews of the book, or to continue this dialog, please check out Pam's blog at <http://pamelaronald.blogspot.com>

**"A must read for those interested in GMOs and/or the organic farming movement"**

Check out the [review of Tomorrow's Table](#) by evolutionary biologist Jonathan Eisen.

**Plant Molecular Biology,**  
October 25-30, St Louis

**Food, sustainability and plant science: a global challenge,** 6 - 7 November 2009, Heidelberg, Germany

**Recent appearances**

**Department of Plant Sciences, UC Davis (Feb 09)**

**University of Hawaii, Manoa** (2/5)

**The Hawaii State Legislature** (2/5)

**Office of Hawaiian Affairs** (2/5)

**Hawaii Crop Improvement Association** (2/6)

**University of Hawaii, Hilo** (2/7)

**Alternatives in Agriculture seminar, UC Davis (Feb 09)**

**"Sustaining agriculture through global collaborations in the plant sciences", Workshop on Future Horizons of Plant Sciences at Howard Hughes Medical Institute** (1/09)

**State Agricultural and Rural Leaders Legislative Chairs Summit, San Diego** (1/24)

**Presentation to the Undersecretary of Agriculture, Gale Buchanan, UC Riverside** (12/08)

**Presentation to the Undersecretary of Energy, Ray Orbach, Joint Bioenergy Institute** (12/08)

**November 25th**  
**Corvallis State University**  
**Food for Thought Lecture series**

**November 21**  
**The Campus Community Book Project**

**Global Food Situation: UC Davis Faculty Analysis and Response**

**November 17th**  
**UC Davis Centennial Symposia**  
**Foods for Health in the 21st Century: A roadmap for the Future**

**Oct 20, National Institute of Technology Standards**

Here are my favorite parts of his review (just a little cherry picking here):

"I personally like the book a great deal, and enjoy how it switches back and forth between the authors (Pam and her husband Raoul Adamchak) and how it interweaves personal stories with discussion of the science and practice of organic farming and plant genetic engineering..."

...the book really is a must read for those interested in GMOs and/or the organic farming movement as well those thinking about "slow food" and other related topics. In addition it is a wonderful personalized story, with a mixture of recipes, stories of research, discussions of teaching about organic agriculture, and some minor family drama. For the same reason that I like Amy Harmon's New York Times stories (such as the recent one on evolution) I like this book - it personalizes what is frequently a boring impersonal discussion..."

#### **Jonathan's full review:**

Tony Trewavas has an interesting review (Redefining "Natural" in Agriculture) in PLoS Biology of my friend and colleague Pam Ronald's new book "Tomorrow's Table: Organic Farming, Genetics and the Future of Food."

I was planning on eventually writing my own review of her book but not sure when I will get to it. I personally like the book a great deal, and enjoy how it switches back and forth between the authors (Pam and her husband Raoul Adamchak) and how it interweaves personal stories with discussion of the science and practice of organic farming and plant genetic engineering.

Trewavas has some things in the review I agree with a great deal like

"The text deals with many of the questions raised by the public about GE crops in a sensible and balanced manner, quoting various sources of reliable information on the concerns about risks to health and environment that often recur. It also mentions Richard Jefferson, who is Chairman of CAMBIA, a non-profit organisation that attempts to make the tools of biotechnology widely and freely available (<http://www.cambia.org/>). As a scientist, I cannot help but applaud!"

I personally love what CAMBIA is doing and found the discussion of CAMBIA in the book to be interesting. I have gotten to know Richard Jefferson over the last few years and think he is a true pioneer in revolutionizing biotechnology and freeing it from the shackles of over protectionism.

Trewavas also has a very interesting thread about the value of different opinions. Since this was printed in PLoS Biology and is under a CC license I can reprint it here (with acknowledgment of the source - Citation: Trewavas T (2008) Redefining "Natural" in Agriculture. PLoS Biol 6(8): e199 doi:10.1371/journal.pbio.0060199) and it is worth doing so:

The continuing conversation did not resolve the issues between them. It convinced me, however (if I needed convincing), that while everyone is entitled to their opinions, when dealing with detailed technical matters of science or medicine or any subject that requires enormous qualifications and experience, the notion that all opinions have equal validity is simply downright wrong. If you want real information on the safety of heart surgery procedures, do you follow the advice of a qualified heart surgeon or the local butcher? If you want advice on flying a jumbo jet, do you ask the local bus driver or a pilot with 10,000 hours of experience flying jumbo jets? And if you want advice on how to captain a supertanker, do you ask a person whose experience is limited to rowing a dinghy? Mistakes by surgeons are not uncommon, 70% of air crashes result from pilot error, and occasionally supertankers hit the rocks. But relying on rank amateurs instead of professionals would guarantee instant catastrophe. Many branches of science are very complex. However, being a scientist isn't enough, of course, as being a scientist doesn't qualify you to advise on any subject except your specialty. To provide advice that can lead to sensible policy requires not only a thorough understanding of the workings and literature of the particular scientific area but many

#### **Accelerating Innovation in 21st Century Biosciences**

Gaithersburg, MD 20899 USA

Sept 26th, 7:30 p,  
Appetizers start at 7 PM  
**Placer Nature Center**  
**4th Friday lecture series**  
Auburn, CA

Each Main Course includes a seasonal appetizer of delectable local music which ranges from folk and jazz, chamber to blues. These specialties are homegrown including the Auburn Concert Band, Aisle 6, Confluence, and the Raspberry Jam String Band. Each Main Course ends with a riveting Question & Answer Period  
Download information and flyer [here](#)

Sept 13, 2 pm  
**San Mateo Public Library**

Sept 11, 1:30  
National Seed Growers Association  
UC Davis Seed Biotechnology Center

Sept 9, 7 am LIVE  
**KVON 1440AM** - Wine Country News & Talk - Napa, CA

August 6, Washington, DC, Ronald speaks at the **National Research Council (NRC) Workshop on Twenty-first Century Systems** NRC convened a committee to examine the scientific foundations of production systems and management practices that contribute to a farm's sustainability, and explore the social, economic and political factors that influence the adoption of such systems and practices by farmers in the United States and abroad

August 5th  
**The Inoculated Mind-**  
**Mindcast weekly science radio**

June 27th, 11 am PDT  
**How She Really Does It**  
KDRT 101.5 FM in Davis, CA  
Download the podcast [here](#)

June 23  
**Food Fight**  
Oxford University Press

June 21, 7:30 pm PDT  
**The Avid Reader**, Davis

June 18th, 2-3 pm, EDT

decades of experience in that field.

It is unfortunate that for the past 40 years, agriculture in particular has been damaged by opinionated groups of the public that have forcefully used fear and anxiety and carefully selected information to try and coerce policy makers to adopt their own mistaken and unqualified views. Fear and emotion do not make for good policy. I applaud Ronald's conclusion that "if citizens vote, it should be for a specific matter on which they are well informed, not because of general concerns about a new technology."

The corollary is that on most technical matters, the public can never be well enough informed. If scientific knowledge does not form the basis of policy on technology, basing such policy on ignorance can be guaranteed to generate disaster. It was Slovik in his classic Perception of Risk [3] who demonstrated that non-experts overestimate the frequency of death from rare causes while underestimating the frequency of common causes of death, and who established clearly how additional knowledge changed expert understanding. The use of the local ordinance by activist groups to stop GE farming is only too reminiscent of the damage done by Lysenkoism to Soviet farming in the 40s, which took decades to recover from, once it was abandoned.

Basically, he is indirectly agreeing with Ronald/Adamchak that some negative opinions of GE are simply not valid. Here I think I disagree with all of them. I think much of the objection to GE modification of plants is an esthetic objection and thus presenting scientific arguments for why it is OK to do is a bit off tangent. It is kind of like when someone says "that house is ugly." Do you respond by saying "Well, actually, the shape and color patterns have been shown to appeal to human sensory systems" Not too helpful. I feel that the same is happening with GE plants --- if people's instinctively do not like them, telling them about the science is not necessarily going to help. Nothing wrong with educating about the science, but I think it is a red herring to say that some of the anti-GE folks do not understand the science and therefore their objections must be wrong. I feel similar vibes in the evolution education discussion going on around the world. I think many people latch on to ID and Creationism because it appeals to them in an esthetic sense. And one needs to be really gentle/careful about bringing science into the discussion (except of course, when one is teaching a science class --- then you teach the science).

So sure - I have some quibbles about parts of the book. As does Trewavas (he has to raise some objections - any book review that does not have them seems like fan mail and not a review).

Despite my quibbles here and there, the book really is a must read for those interested in GMOs and/or the organic farming movement as well those thinking about "slow food" and other related topics. In addition it is a wonderful personalized story, with a mixture of recipes, stories of research, discussions of teaching about organic agriculture, and some minor family drama. For the same reason that I like Amy Harmon's New York Times stories (such as the recent one on evolution) I like this book - it personalizes what is frequently a boring impersonal discussion.

And of course it does not hurt that the heart of the story / discussion is good. Ronald/Adamchak present an overall idea I have a hard time arguing against - GE and organic growth practices both have a lot to offer the world and if we took the good parts of both, a "GE-Organic" system might be highly beneficial to all. For example, in principle, GE plants can lead to a reduction in the use of pesticides and fertilizer. Similarly, they could lead to a reduction in water use and higher crop yields. Since it seems unlikely that the current organic movement will embrace the benefits of GE crops, it will probably require a whole new movement to merge the two. It will also require the companies and organizations that push GE to do it with the environment and health of people and the planet in mind. To me, the biggest problem with GE food and farming is that it seems to be used more to help the farmers and the companies selling stuff than the consumers and the public. If that changed, I can see people embracing GE plants in much the same way they embrace GE medicines.

**Richard B. Simches Research Center, Room #3110  
Boston, Massachusetts  
Hosted by the [Department of Molecular Biology](#) at Massachusetts General Hospital and the [Department of Genetics](#), Harvard Medical School**

**June 5  
[Solving the Food Crisis With an Unlikely Alliance](#)  
U.S. News and World Report**

**June 3, 12:30 p  
[International Food Information Council](#)**

**May 27th 5:30-6p  
Local Dirt  
[KDVS, 90.3 FM](#)**

**May 22nd, noon- 1p  
[242 Asmundson](#)  
UC Davis**

**May 17th, 3 p  
[Science Fantastic radio talk show](#)  
Please call 800-449-8255 to ask questions!**

**May 13th, 2-4p  
University of Arizona  
[Department of Plant Sciences](#)**

**May 1st, 6 am EST  
Hear Pam and Raoul on WNYC and Public Radio International's new program "[The Takeaway](#)"**

**April 24th 7:30 pm  
[Mrs. Dalloway's bookstore](#)  
2904 College Ave., Berkeley, CA  
(510) 704-8222**

**Tuesday April 15th, 2 pm  
Capital Public Radio's "[Insight](#)"  
Hosted by Douglass Everett, on KXJZ. Listen [here](#).**

PS - For more on the book see Pam's blog here.

Posted by Jonathan Eisen at 8/27/2008 08:19:00 A

### **"I highly recommend the book" says Sean Feder**

By WES SANDER  
For the Capital Press

Pamela Ronald and Raoul Adamchak say they're not proposing a seismic change in mainstream farming practices - just the next step in a long evolution.

Ronald and Adamchak are the husband-and-wife authors of the book "Tomorrow's Table: Organic Farming, Genetics and the Future of Food," published in April. Ronald is a professor of plant pathology and chair of the Plant Genomics Program at the University of California-Davis; Adamchak manages UC-Davis' organic farm.

"It's not so much replacing conventional agriculture as (altering it)," Adamchak said.

The authors advocate combining genetically engineered crops with organic growing practices as a means of feeding the world in a sustainable manner. They say they've heard criticism from both sides.

The organic-farming community tends to show a protectiveness of federal organic-certification standards, they say. Defined by federal rules in the 1990s, organic certification cannot be awarded to any crop created through genetic modification. But these authors don't want to mess with organic standards.

"One of the things we're encountering is that people are posing this false choice - conventional or organic?" Ronald said.

Those categories tend to be defined by current realities. For example, bioengineered crops are often connected with large corporations that control the distribution, pricing and use of seeds.

Observers describe such practices as counterproductive in impoverished regions of the globe. Ronald and Adamchak are not advocating any current market structures - they're describing the value of two growing systems from the perspective of agricultural science.

As organic farming gained popularity in the last 15 years, bioengineering has also ascended the market. Now, bio-engineered crops account for 50 to 90 percent of commercial crops for which they are available, the authors say - notably cotton, corn, canola and papaya.

When a virus nearly wiped out Hawaii's papaya crop in the mid-1990s, scientists responded by engineering a resistant strain. Today, that strain accounts for most of Hawaii's papaya crop, allowing for a reduction of chemical usage.

Engineered crops do have their limits. Chinese cotton growers found success with a bio-engineered crop that is resistant to caterpillars. But when they found it susceptible to other pests, they turned again to chemical pesticides.

Ronald and Adamchak say those growers might still have avoided chemicals by combining the bio-engineered plant with organic growing techniques, such as crop rotation and integrated pest management. It's that sort of combining of practices that is necessary to feed the world's population in a sustainable manner, the authors say.

Because they cannot use chemical crop applications, organic growers rely on the best-performing seeds they can get, Adamchak said. Those seeds were developed through selective breeding, a technique by which new strains have been created for centuries. The end result

of that process, Ronald says, is no different from what is created by laboratory methods.

"To me it doesn't matter if it's genetically engineered or conventionally bred," she said.

Ronald has worked for years with several other researchers to modify a rice strain to tolerate consecutive weeks of submergence beneath floodwaters. The findings were published in 2006, and the rice has become popular in Bangladesh, where flooding periodically destroys rice crops.

"We have to put things in perspective, and I think people are fixated on how dangerous (genetic engineering) is, without knowledge to back it up," said Sean Feder, an agricultural professional who oversees organic-crop inspections in California.

Feder works for California Certified Organic Farmers and stressed that his opinions are not his employer's.

"I highly recommend the book," he said. "I think we can use a bit more of an open mind."

Freelance writer Wes Sander is based in Sacramento. E-mail: wes@wessander.com.

### **Review of Tomorrow's Table: A soothing draught and an easy glide**

This review just in from Edible East Bay, a quarterly newsletter that celebrates the abundance of local foods, season by season:

"Our world is facing several converging crises—environmental, social, and political—that are affecting, or will affect, the availability of food to all people. This convergence on the issue of food is making our food policies and production practices more visible than ever. Genetic engineering has become a topic of hot debate in this climate, and it is long overdue for citizens to educate themselves on the matter...

In Tomorrow's Table: Organic Farming, Genetics, and the Future of Food, we hear from practitioners in the field of genetic engineering: Pamela Ronald, professor of plant pathology and chair of the Plant Genomics Program at UC Davis, and her husband, Raoul Adamchak, a veteran organic farmer who assists in his wife's research. The two believe that the technology can be (and is being) put to work to the benefit of humanity and global environmental stewardship. In these confusing times, I for one find such creative solutions to the world's problems to be a soothing draught, and the arguments put forth in this book are compelling enough to make one want to rethink the whole matter. Ronald and Adamchak wrote the book, tag-team. It's such an easy glide that we are happily led back through lessons we once slept through in high school, like basic biology and what constitutes the scientific method. This book also includes memorable characters, recipes, and a fabulous glossary of terms useful in the debate over genetic engineering."

Cheryl Koehler

### **Check out the latest review of "Tomorrow's Table" published in PLoS Biology.**

Redefining "Natural" in Agriculture

Tony Trewavas

Citation: Trewavas T (2008) Redefining "Natural" in Agriculture. PLoS Biol 6(8): e199 doi:10.1371/journal.pbio.0060199

Published: August 19, 2008

Copyright: © 2008 Tony Trewavas. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abbreviations: GE, genetically engineered

Tony Trewavas is with the Institute of Molecular Plant Science, University of Edinburgh, Edinburgh, Scotland, United Kingdom. E-mail: [trewavas@ed.ac.uk](mailto:trewavas@ed.ac.uk)

The place of genetically modified crops in sustainable agriculture has been the subject of heated debate for decades. A new book takes an innovative approach to this debate by presenting the perspectives of an unlikely pair of co-authors [1]. Pam Ronald is a plant molecular biologist, genetic engineer, and supporter of genetically engineering crops for the benefit of humanity. Raoul Adamchak is an organic farmer. Given the known antagonism of many organic advocates to genetically engineered (GE) crops, one would not have thought these two authors would be able to provide an agreed text. But Adamchak is married to Ronald and, to judge from the text, happily so. The authorship of the individual chapters alternates between the two. The subject matter deals with organic farming methods, GE methods, questions of environmental conservation, risk, trust, and ownership of seeds and genes. The last chapter, and the only one written jointly, concludes that some marriage of organic and GE technology will represent the agriculture of the future.

I must admit to holding the same view some 15 years ago, but not now. I assumed that the use of GE technology would be rather like the green revolution. Universities and research institutes would make new crop plants available and free to those that needed them. What has intervened of course for GE is the input of commercialism, which has muddied the waters. Organic farming is not immune to commercial pressures either, and there are strong suspicions that the organic industry's antagonism to GE is a marketing ploy. Mutated crops, induced by radiation, for example, have been used for many years by conventional and organic farmers alike, and it is now known that radiation mutation causes much greater genomic change than GE technology [2].

The text deals with many of the questions raised by the public about GE crops in a sensible and balanced manner, quoting various sources of reliable information on the concerns about risks to health and environment that often recur. It also mentions Richard Jefferson, who is Chairman of CAMBIA, a non-profit organisation that attempts to make the tools of biotechnology widely and freely available (<http://www.cambia.org/>). As a scientist, I cannot help but applaud!

A substantial part of the book gives accounts of conversations between Pam Ronald and others about GE, enabling her to easily justify why it is supported by many in universities. I particularly enjoyed an account of one conversation between Pam Ronald and a relative (a lawyer) who argued against GE crops. This particular discussion started because several counties of California had voted on an ordinance that would have banned GE farming. The relative had voted for the ordinance. I quote several passages to give a flavour to this discussion.

Lawyer: "I voted for the ordinance because it will send a message to the large corporations that the onus is on them to prove their products are safe."

Ronald: "I point out that the ordinance contained no language concerning the role of corporations and I mention that the US National Academy of Sciences and the Royal Society in London (the supreme scientific bodies in these countries) have both indicated that these crops are safe."

Lawyer: "Even if they are safe to eat I don't like the idea that many of the GE crops grown in the US are sprayed with herbicides." [The reference here is to glyphosate, used to control weeds in GE herbicide-tolerant crops.]

Ronald: "The good thing about glyphosate is that it is known to be non-toxic to mammals and does not accumulate in water or in soil."

Lawyer: "But even if the herbicide is non-toxic, I have read that there is a chemical mixed with the herbicide that can harm fish." [This refers to a surfactant used in some glyphosate formulations.]

Ronald: "Well if it is the surfactant you object to, wouldn't it make more sense to simply ban the surfactant or the herbicide itself?"

Lawyer: " It would be a political dead end to ban the herbicide because lots of people like to use it in their garden."

The continuing conversation did not resolve the issues between them. It convinced me, however (if I needed convincing), that while everyone is entitled to their opinions, when dealing with detailed technical matters of science or medicine or any subject that requires enormous qualifications and experience, the notion that all opinions have equal validity is simply downright wrong. If you want real information on the safety of heart surgery procedures, do you follow the advice of a qualified heart surgeon or the local butcher? If you want advice on flying a jumbo jet, do you ask the local bus driver or a pilot with 10,000 hours of experience flying jumbo jets? And if you want advice on how to captain a supertanker, do you ask a person whose experience is limited to rowing a dinghy? Mistakes by surgeons are not uncommon, 70% of air crashes result from pilot error, and occasionally supertankers hit the rocks. But relying on rank amateurs instead of professionals would guarantee instant catastrophe. Many branches of science are very complex. However, being a scientist isn't enough, of course, as being a scientist doesn't qualify you to advise on any subject except your specialty. To provide advice that can lead to sensible policy requires not only a thorough understanding of the workings and literature of the particular scientific area but many decades of experience in that field.

It is unfortunate that for the past 40 years, agriculture in particular has been damaged by opinionated groups of the public that have forcefully used fear and anxiety and carefully selected information to try and coerce policy makers to adopt their own mistaken and unqualified views. Fear and emotion do not make for good policy. I applaud Ronald's conclusion that "if citizens vote, it should be for a specific matter on which they are well informed, not because of general concerns about a new technology."

The corollary is that on most technical matters, the public can never be well enough informed. If scientific knowledge does not form the basis of policy on technology, basing such policy on ignorance can be guaranteed to generate disaster. It was Slovik in his classic *Perception of Risk* [3] who demonstrated that non-experts overestimate the frequency of death from rare causes while underestimating the frequency of common causes of death, and who established clearly how additional knowledge changed expert understanding. The use of the local ordinance by activist groups to stop GE farming is only too reminiscent of the damage done by Lysenkoism to Soviet farming in the 40s, which took decades to recover from, once it was abandoned.

Adamchak describes organic farming as working through biology and conventional farming as working through chemistry. The commonest reason the public gives for buying organic food is that it is natural (or biological; in France, organic food is described as *biologique*) and lacks "chemicals" because pesticides are not used to control pests. Adamchak's supposition is completely erroneous; plants have always used chemicals to control pests. Allelopathic plants kill other competing plants by secreting toxins from leaves and roots, and there are at least 100,000 natural toxins (pesticides) synthesised by higher plants to kill insect herbivores and found in all fruits and vegetables. When tested toxicologically on rodents, the daily average diet is known to contain natural pesticides that are nerve toxins, many carcinogens, endocrine disruptors (that either mimic oestrogen or induce male sterility), and other pesticides that interfere with cell division, cause chromosome breakage, or damage blood, skin, or thyroid. The list is remarkably similar to the claims made by activist groups about the biological effects of synthetic pesticides.

We are not adapted to exposure to these natural chemicals. The dozen or so nerve toxins in potato have in the past killed at least 30 people and caused sickness in thousands [4]; another nerve toxin, cucurbitacin in organic courgettes, has caused illness in large numbers of people. The endocrine disruptors (genistein and others) in soy are actually recommended to menopausal women to mitigate the

symptoms arising from lower oestrogen content, while psoralen in parsnip, figs, and celery causes damaging skin blisters, and so on.

Natural pesticides represent about 1%-5% dry weight of any vegetable or fruit. There is a simple seesaw relation between yield and natural pesticide content. In crop breeding, the natural pesticide content has been reduced to increase yield, making produce safer for human consumption but now requiring additional synthetic pesticide to offset the reduced resistance. The margin of health safety for natural pesticides is small; for the traces of synthetic pesticides, it is enormous. If organic advocates object to the fact that traces of synthetic pesticides can be detected weeks after consumption, solanidine, one of the potato nerve toxins, has been shown to have a half life in the liver of several months. With present technology, the solanidine consumed in one potato could be detected years later, but this is almost the only natural pesticide whose biological stability has been examined. There is nothing unnatural about farmers using pesticides; biology uses chemistry to control pests. Natural certainly does not mean safe.

Although I could offer many other criticisms of individual parts of the book, I greatly enjoyed reading it. The most important omission that cannot be glossed over, however, is that of agricultural context. Support for any kind of agricultural technology depends simply on the context of the times. There is an old saying: "one food, one problem, much food, many problems." For those whose next meal—and the next and the next—is a bowl of rice, other problems, such as whether food is organic or not, are of little consequence. Their one problem is where to get their next meal, and the only method of acceptable farming in this context is the one that gives the maximum yield, year in and year out. Wheat is grown on more acres worldwide than any other cereal. In the United Kingdom, average organic wheat yields are four tonnes per hectare whilst conventional yields are averaging eight.

I regard the obsession amongst some for organic farming as merely a reflection of wealth, an apparent abundance of food, and a feeling that the problem of food security is solved. But the world for wealthy countries is changing. Global warming, greenhouse gas emissions, biofuels, and soaring oil and food prices are among the many new problems; food security is again becoming a hot topic. Environmental issues, clearly only part of the good times, are declining in relevance.

Although Ronald and Adamchak mention no-till agriculture only briefly, this is surely the agriculture of the future. No-till farms produce only one third of the greenhouse gas emissions of an organic farm [5]. No-till eliminates soil erosion and improves environment, wildlife, and soil. Most importantly, it maintains a conventional yield. Currently 10% of United States farms are totally no-till, and another 60% are partially no-till; this achievement is due almost solely to the availability of GE herbicide-tolerant crops.

No-till is not an amalgam of organic and GE technology but something that was derived from observations of nature in a very different way. Faulkner, the perceptive founder of no-till in 1943 [6], derived his revolutionary ideas from asking himself a very simple question: Why don't the prairies suffer from the present (1940s) problems of US agriculture? Faulkner's answer: the prairies are not subjected to that most damaging of all soil treatments: the plough. Leaving crop residues on the surface is the nearest any form of agriculture comes to mimicking the annual and natural cycle of the meadow. Herbicides are human "allelopathy" of weeds, and humans are part of nature too. If you want an agriculture that is nearest nature, then this is surely it.

Ronald PC, Adamchak RW (2008) *Tomorrow's Table: Organic Farming, Genetics and the Future of Food*. New York: Oxford University Press. 232 p. ISBN (hardcover): 978-0195302755. US\$29.95.  
References

1. Ronald PC, Adamchak RW (2008) *Tomorrow's table: Organic farming, genetics and the future of food* New York: Oxford University Press. 232 p.
2. Batistia R, Saibo N, Lourenco T, Oliveira MM (2008) Microarray analyses reveal that plant mutagenesis may induce more

- transcriptomic changes than transgene insertion. Proc Natl Acad Sci U S A 105: 3640-3645. Find this article online
3. Slovik P (2000) The perception of risk London: Earthscan. 473 p.
  4. Morris SC, Lee TH (1984) The toxicity and teratogenicity of solanaceae glycoalkaloids, particularly those of the potato: A review. Food Technol Australia 36: 118-124. Find this article online
  5. Robertson GP, Paul EA, Harwood RR (2000) Greenhouse gases in intensive agriculture: Contributions of individual gases to the radiative forcing of the atmosphere. Science 289: 1922-1925. Find this article online
  6. Faulkner E (1943) Plowman's folly New York: Grosset and Dunlap. 161 p.

#### Tomorrow's Table in the classroom

"I really enjoyed the book. It did a great job of keeping everything in perspective. Use again !"

"Use again! A great resource and easy to understand"

"The textbook was great. It had a story line to it. It was easy to remember."

These are some of the comments from Oregon State University students who read the book, "Tomorrow's Table: Organic Farming, Genetics and the Future of Food".

Steven Strauss, Distinguished Professor of Forest Biotechnology at Oregon State University, who directs the OSU Program for Outreach in Resource Biotechnology, chose the book for his course, which give students and the public scientifically reliable information about the use of genes and chemicals in agriculture and natural resources.

Thanks Steve, for being the first to use it in the classroom!

#### An Excellent Introduction To Biotech and A Unique View , July 20, 2008

By **J. Canestrino** (Lodi, CA United States) - [See all my reviews](#)

REAL NAME

I made it through the book in a day or two. It is not overly technical; it is an excellent introduction to biotech and organic farming. I did not really get into the book until the last chapter; I guess I kept wishing for more technical information, for the authors to drive home their point of view.

However, the point they are trying to make cannot be more important. That is that biotech has a place in organic farming to make it more "sustainable". RoundUp ready crops have made it possible for farmers to stop using much more damaging and toxic herbicides and to go to no-till farming to preserve topsoil. It is the only answer for some problems sometimes, such as virus resistance. It would allow conventional farmers of sweet corn to stop using a slew of really noxious insecticides.

Like Dr. Savage said in his review, I do not think that the organic farming movement is going to "hear" this message and see the wisdom in it, but if they could I think they would have to redefine the way they think of organic vs. sustainable.

|

1 of 1 people found the following review helpful:

**★★★★★ Reason and humanity....Enough?**, May 26, 2008

By **Steven D. Savage "The grape doctor"** (Encinitas, CA) - [See all my reviews](#)

REAL NAME

Pam and Raul's very well written book makes the rational and even emotional argument that biotechnology is fully compatible with the core ideals of the organic movement. I completely agree with that

position looking back to my grandfather's version of "organic" from the 1960s.

I wish I could believe that Pam and Raul's logical arguments will fly with the core of the "organic consumer" movement. They make excellent rational arguments. I'm not sure this debate is about that. As Mark Twain said, "you can't reason someone out of a position they weren't reasoned into in the first place."

As much as I wish otherwise, I'm not optimistic that this book will succeed in its aim to reconcile "organic" and "biotech". Even so, it does a great job of explaining the societal benefits of biotech crops and it helps to humanize the people that have made this a reality.

This is a book that everyone focused on the environment should read.

Steven Savage, Ph.D.  
savage.sd@gmail.com

|

★★★★★ **A pleasant surprise**, August 30, 2008

B **Phil Stewart "Real Name gets a ""?"** (Gainesville, FL USA) -  
y [See all my reviews](#)

I was given this book by a friend who is an organic "true believer" and when he handed me a book I sort of expect a re-hashing of the usual pro-organics arguments I've heard many times over the years. Instead I was pleasantly surprised.

The book is straight forward, well-reasoned, and accessible. I have a background in agriculture and molecular biology, and so at times I found the science a tad too simplistic to strongly hold my interest, but I suspect that for the average reader, it strikes a nice balance between addressing the subject fully and excessive complexity and jargon. The case they build is in my view quite compelling, and I hope this book serves to open many minds.

When I was starting out in plant science, I remember a professor telling me that when the first transgenics were being developed, he really thought the organics crowd would be the biggest supporters. "We'd just come up with a solution to their biggest problems, but instead they decided we were the enemy". Although I think that organics are, ultimately, a positive development in agriculture, they are like most "movements" a mixture of real reasons and irrational, emotional impulses. Although organic agriculture has been an important step towards a sustainable future, it has brought with it a fair amount of baggage, based on not on science or reason, but on a nostalgic idealization of traditional agriculture--even though such agriculture was often neither natural nor sustainable nor especially desirable, even then. The fear of genetic engineering seems to me to come from that deeply conservative undercurrent in an otherwise progressive movement. By making the facts behind genetic engineering and its impacts on agriculture and environment accessible to a general audience, this book can hopefully be a step towards calming that reactionary impulse.

It helps too that it is also an easy and enjoyable read. By the end I felt as though I'd kind of gotten to know the authors (in fact since we don't live all that far apart and work in vaguely the same field, it crossed my mind that I might someday bump into them). The style is casual without being superfluous, making it easy to lose yourself in the book. I started this book as I tended the grill before dinner, and finished it as I went to bed the same night.

Putting aside the genetic engineering part, even, this book is also simply one of the best scientific presentations of organic agriculture I have read, in that it is soundly grounded in the literature and does not over-reach, while remaining staunchly and reasonably pro-organic. There are few other books on the topic I can say the same for.

All in all a good read about an important topic.

**Required reading for foodies,**

June 16, 2008

By **R. Santer** (Davis, California United States) - [See all my reviews](#)

REAL NAME

As a consumer who shops at grocery stores that specialize in organic food, I have noticed a proliferation of signs and labels stating that this or that product is GE or GMO free. These labels don't do much to inform the public and do much to increase anxiety. This book is a great antidote; informative and detailed, clear and engaging.

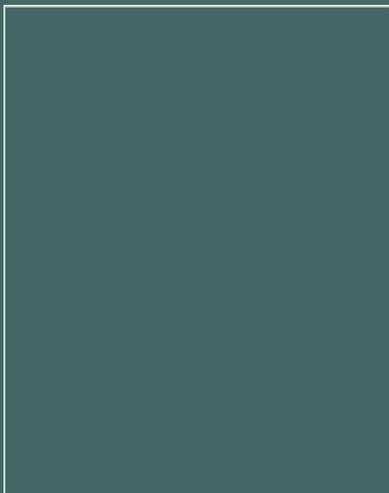
Readers of recent books on the politics of food, such as *Animal, Vegetable, Miracle* by Barbara Kingsolver or *The Omnivore's Dilemma* by Michael Pollan will be interested in the authors' global perspective and local expertise, and I was especially glad to read about the potential impact of GE food in developing countries.

\*\*\*\*\*

## Tomorrow's Table, una búsqueda de la verdad sobre la agricultura orgánica y la modificación genética

[Mar. 09/12/2008 - 11:49](#)

- [Noticias](#)



Pamela C. Ronald y Raoul W. Adamchak son los autores de un libro que pretende mostrar al público un estudio empírico y riguroso sobre las técnicas empleadas en la agricultura orgánica y en la actual modificación genética

La problemática actual sobre el uso de la ingeniería genética ha sido objeto de estudio para una investigación que ofrece tanto datos científicos como los componentes éticos que están necesariamente unidos a este tipo de avances tecnológicos.

A grandes rasgos *Tomorrow's Table* ofrece tres ejes fundamentales de estudio: los componentes científicos implícitos en el desarrollo de las semillas, los elementos morales intrínsecos en la problemática de las patentes y la visión que el público tiene sobre la actividad de los científicos.

Para Pamela C. Ronald, el público necesita entender el proceso que siguen los científicos en los mecanismos de modificación genética y aprender distinguir a aquellos que están altamente cualificados. Entender el proceso científico es importante no sólo para promover a la propia ciencia, también para favorecer que la sociedad ofrezca una mayor tolerancia y se adapte a los cambios que ofrece la misma.

En esta rigurosa investigación se ofrece algunos criterios útiles para que el público sea capaz de distinguir los rumores de la ciencia de calidad, sujeta a los métodos rigurosos. Entre ellos destacan examinar la fuente de información primaria, comprobar si el trabajo fue publicado en una revista científica, determinar si hay una confirmación de la información en otro estudio publicado, o averiguar que conflicto de intereses puede existir en la información ofrecida.

Un aspecto importante a estudiar en estos procesos son las semillas. Las empresas de semillas trabajan en variedades que crezcan antes, uniformes o resistentes a sequías. Muchas de estas nuevas variedades se denominan híbridos, que poseen diferentes variedades de la misma especie. Estas semillas orgánicas son caras pero muchos las compran por las calidades que ofrecen. La popularidad de los híbridos ha ido aumentando mucho en los últimos años.

Otra técnica utilizada es la llamada “polinización abierta”, este proceso permite que después de algunas generaciones se consigan los efectos buscados, como conseguir mejor sabor, variedades más grandes o más duraderas.

La modificación genética es el mismo proceso que ocurre en la polinización abierta, la ventaja de la primera con respecto a la segunda es que permite introducir un único gen, mientras que siguiendo el proceso tradicional para introducir un gen hay que introducir muchos más a la vez.

La problemática de las patentes también es objeto de estudio para los autores del libro. Para ellos el actual sistema de patentes está frenando la innovación y dando una mala imagen a las plantas biológicas. Muchos de los inventos son exclusivamente licencia de compañías privadas, generando un oligopolio dominado por cinco firmas (Monsanto, Dupont-pioneer, Sygenta, Bayer, BASF). Esto significa que las compañías privadas tienen ahora mucho más control de quién usa esta tecnología.

Un ejemplo característico es el “Golden Rice”, aunque el trabajo ha sido orientado hacia el dominio público, más de 70 patentes tienen la potestad del desarrollo de este arroz.

No obstante gracias a la asistencia de instituciones como la Fundación Rockefeller, las empresas privadas que tienen los derechos de propiedad intelectual han estado de acuerdo en que esta tecnología podría ser usada con fines humanitarios, consiguiendo que hoy día el “Arroz dorado” esté disponible libre de cargos. Así mismo, esta fundación está trabajando para que la tecnología implícita en la modificación genética sea accesible para aquellos que más lo necesitan, ayudando a establecer instituciones como la Fundación Africana de Agricultura Tecnológica (AATF). No obstante, para los autores sin un buen gobierno y el establecimiento de políticas directas o adecuadas políticas de propiedad intelectual, no se pueden solucionar estos problemas.

El estudio desarrollado en Tomorrow’s Table pone de manifiesto la riqueza analítica que posee la investigación de los autores, ofreciendo al lector una rigurosa visión de la problemática presente en la modificación genética de alimentos. Todo ello deja patente como la puesta en común de los conocimientos de genética de Pamela C. Ronald y la experiencia de su marido como granjero orgánico ha sido el punto de partida para desarrollar el estudio, utilizando la dialéctica como núcleo de la investigación



## **The future of food may depend on an unlikely marriage: organic farmers and genetic engineering**

- [The Boston Globe](#)