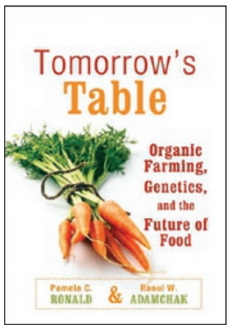
Orgenic Food



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

By Pamela C. Ronald and Raoul W. Adamchak

Oxford University Press, 2008
232 pp., hardcover, $29.95
ISBN 978-0195301755

Reviewed by Jonathan Gressel

There have been many married teams in science since the Curies, but none (to my recollection) have been so superficially at opposite ends of the spectrum; one an advocate of organic farming and the other a gene jockey. In this erudite book, Pamela Ronald and Raoul Adamchak reach for a middle ground. Marriage may get in the way of accuracy, as they never contradict each other. Thus, we are repeatedly told that organic produce is healthier despite the disproportionate number of recalls of organic foods due to high mycotoxin or bacterial contaminations; leafy vegetables should not be cultivated with organic manures; and pesticides control disease vectors. It is not true that organic farmers do not use pesticides or inorganic fertilizers as intimated in the early chapters; they legally use copper sulfate fungicides such that some soils are now toxic, and botanical insecticides that are potent fish toxins. They use rock phosphate fertilizer, which is exceedingly wasteful compared to processed superphosphate. Meta-analyses should have been presented instead of cherry-picked data on comparative yields and energy requirements, but all that would have dimmed the romantic light initially given to organic agriculture. We might have had a more accurate dialog if friendly adversaries who do not have to live together had written this book.

That is not to say that conventional agriculture does not have much to learn (or relearn) from science-based organic agriculture. Still, many conventional farmers use technologies that organic agriculture likes to call its own: minimum tillage, crop rotation, integrated pest management and use-optimal timing of pesticide and fertilizer applications to minimize off-target effects. No matter how one cuts it, organic agriculture is at present akin to religious orthodoxy, with the introduction of new technologies subject to illogical scrutiny by conservative fundamentalists. The standards for organic agriculture legislated by many governments resemble fundamentalist religious decrees. The book is an impassioned call to reform this religion by adopting aspects of biotechnology befitting the enlightened aspects of theology but not the benighted aspects of religious practice. The authors convince me, but I doubt that the high priests of organics will be convinced. Those priests prohibit even totally organic herbicides because they are new, thus necessitating intensive manual weeding.

Although Adamchak describes the emotional and antiscience beginnings of organic agriculture ("spirituality over peer-reviewed science"), he credits modern breeding and scientific experimentation with considerable advances in organic productivity. Ronald writes excellent chapters that are meant to help the public learn what genetic engineering is about, and how to distinguish junk science from rigorous science. She also includes an excellent discussion on scientific versus emotional risk analysis. These sections should be required reading for all scientists who endeavor to explain science to the public.

There is an excellent chapter on weeds, a subject often ignored by proponents of transgenics, despite the fact that the predominant transgenic crops cultivated are resistant to the least expensive and most environmentally benign herbicides. Unfortunately, there is no discussion of how this might eliminate backbreaking, predominantly manual weeding by women in the developing world. Although Ronald discusses the lack of transgene flow issues with presently cultivated transgenic California crops, she does not mention the possibility of transgene flow of herbicide-resistant transgenes from rice, her favorite crop, to a weedy feral form often called red rice. Transgenic herbicide-resistant rice allows weedy rice control, but only until the gene crosses into the weed. That she does not mention this is unfortunate, as she could then have discussed that there are genetic engineering strategies that could prevent such gene flow or mitigate it after the fact. These solutions are not available to rice growers using mutant herbicide-resistant rice, and discussing this issue would have been a good example of the potential superiority of transgenics over mutants. Because the book is so personal, it is mainly Californocentric, and much of the extrapolation of the organic-transgenic controversy beyond the Central Valley is left to the reader.

Adamchak's tribute to well-bred (organic) seed shows the agronomist's understanding of the value of good seed, explaining why many farmers cannot duplicate that value by saving seed. This is bound to anger the antitransgenic NGOs, whose mantra is the poverty-maintaining 'farmer-saved seed', which in the developing world means poor yielding, diseased, and weed-contaminated crop seed.

Luckily, Ronald does not shy away from the issue of who owns the genes and the regulatory costs that stifle public sector research and prevent all but blockbuster corporate transgenics from being released to the detriment of world food security. The plum-pox virus resistance engineered into a single plum variety by US Department of Agriculture scientists is a telling example of such public sector research. The regulatory process is still not finished. It would have been educational to add to this story that when or if the same construct is engineered into additional plum and peach varieties, each new transgenic variety will have to be processed through the regulatory system owing to 'event based' regulation. Governments thus stifle crop biodiversity.

Together, the authors come to the inevitable conclusion of a healthy marriage: ascertain the issues and pragmatically solve the problems. Deal with issues and solutions, not processes. They conclude that there are clearly many transgenes that will render organic agriculture more sustainable, in turn making organic products more available to a larger population.

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