

# New York Times

October 26, 2009

## *Can Biotech Food Cure World Hunger?*

By The Editors

With food prices remaining high in developing countries, the United Nations estimates that the number of hungry people around the world could increase by 100 million in 2009 and pass the one billion mark. A summit of world leaders in Rome scheduled for November will set an agenda for ways to reduce hunger and increase investment in agriculture development in poor countries.

What will drive the next Green Revolution? Is genetically modified food an answer to world hunger? Are there other factors that will make a difference in food production?

- Paul Collier, economist, Oxford University
- Vandana Shiva, activist and author
- Per Pinstrup-Andersen, professor of nutrition and public policy, Cornell
- Raj Patel, Institute for Food and Development Policy
- Jonathan Foley, University of Minnesota
- Michael J. Roberts, economist, North Carolina State University

### **1 Put Aside Prejudices**

Paul Collier is a professor of economics at Oxford University and the director of the Center for the Study of African Economies. He is the author of “The Bottom Billion: Why the Poorest Countries Are Failing and What Can Be Done About It.”

The debate over genetically modified crops and food has been contaminated by political and aesthetic prejudices: hostility to U.S. corporations, fear of big science and romanticism about local, organic production.

Refusing genetic modification makes a difficult problem more daunting.

Food supply is too important to be the plaything of these prejudices. If there is not enough food we know who will go hungry.

Genetic modification is analogous to nuclear power: nobody loves it, but climate change has made its adoption imperative. As Africa’s climate deteriorates, it will need to accelerate crop adaptation. As population grows it will need to raise yields. Genetic modification offers both faster crop adaptation and a biological, rather than chemical, approach to yield increases.

Opponents talk darkly of risks but provide no scientific basis for their amorphous expressions of concern. Meanwhile the true risks are mounting. Over the past decade global food demand has risen more rapidly than expected. Supply may not keep pace with demand, inducing rising prices and periodic spikes. If this happens there is a risk that the children of the urban poor will suffer prolonged bouts of malnutrition.

African governments are now recognizing that by imitating the European ban on genetic modification they have not reduced the risks facing their societies but increased them. Thirteen years, during which there could have been research on African crops, have been wasted. Africa has been in thrall to Europe, and Europe has been in thrall to populism.

Genetic modification alone will not solve the food problem: like climate change, there is no single solution. But continuing refusal to use it is making a difficult problem yet more daunting.

## **2 The Failure of Gene-Altered Crops**

Vandana Shiva is the founder of Navdanya, the movement of 500,000 seed keepers and organic farmers in India. She is author of numerous books, including “The Violence of the Green Revolution” and “Soil, Not Oil.”

Food security over the next two decades will have to be built on ecological security and climate resilience. We need the real green revolution, not a second “Green Revolution” based on genetic engineering. We need biodiversity intensification that works with nature’s nutrient and water cycles, not against them.

Genetic engineering has not increased yields. Recent research by Doug Gurian-Sherman of the Union of Concerned Scientists published as a study “Failure to Yield” has shown that in a nearly 20 year record, genetically engineered crops have not increased yields. The study did not find significantly increased yields from crops engineered for herbicide tolerance or crops engineered to be insect-resistant.

The International Assessment of Agricultural Science and Technology for Development carried out by 400 scientists over four years has also concluded that genetic engineering does not hold much promise. Instead, small farms based on principles of agri-ecology and sustainability produce more food.

That is why I am so disappointed that the Gates Foundation in its global development program is supporting the use of genetically modified crops in Africa.

Green revolution technologies and strategies, reliant on monoculture and chemical fertilizers and pesticides, have destroyed biodiversity, which has in many places led to a decline in nutrition output per acre.

As I have shown in my book “Soil, Not Oil,” industrial systems of food production are also a major contributor to greenhouse gas emissions and climate change. Industrial monocultures are more vulnerable to climate change since they reduce soil organic matter which is vital for moisture conservation and resilience to draught.

The claim by the genetic engineering industry that without genetically modified food we cannot respond to climate change is simply false. Climate resilient traits in crops have been evolved by farmers over centuries. In the community seed banks that I have helped create through the Navdanya movement, we have seeds for drought resistance, flood resistance and salt tolerance. This is the biological capital for the real green revolution.

The gene giants are now pirating and patenting the collective and cumulative innovation of Third World farmers. Patent monopolies on seed cannot create food security. They can only push small farmers in debt.

The green revolution that we are building through Navdanya is based on conserving biodiversity and conserving water while increasing food production per acre. What we need is biodiversity intensification, not chemical intensification. What we need is to work with nature's nutrient cycles and hydrological cycle, not against them. It is time to put small farmers, especially women, at the heart of this process.

### **3 A Green Revolution Done Right**

Per Pinstrup-Andersen is the H. E. Babcock Professor of Food, Nutrition and Public Policy at Cornell University and the 2001 World Food Prize Laureate.

Helping farmers in developing countries produce more food without doing damage to natural resources is an essential component of the action needed to reduce existing poverty, hunger and malnutrition and to assure that future generations have access to the food they need at reasonable prices. While new technology must be tested before it is commercially released, we should be mindful of the risks of not releasing it at all.

Science and technology combined with expanded use of plant nutrients and better plant protection and water management by highly motivated farmers produced the Green Revolution, which avoided mass starvation and helped millions out of poverty and hunger. However, the job is not done.

Many millions of people do not have access to sufficient calories and many more suffer from micronutrient deficiencies. Most of them are in rural areas and would benefit from productivity increases in agriculture. Furthermore, the world population will grow by more than two billion over the next 40 years.

They will only have access to the food and nutrients they need at reasonable prices and without damaging the environment, if action is taken now.

Science must play a key role in such action, along with appropriate government policies and investments in rural infrastructure and markets. Science must be put to work to develop drought tolerance and pest resistance in crops, higher nutrient quality of staple foods, reduced animal diseases, mitigation of negative climate change effects and a host of other solutions to the current food losses and risks facing farmers and consumers in developing countries. The most appropriate scientific approaches, including genetic engineering and other molecular biology must be applied.

While new technology with potential health or environmental risks must be tested before it is released for commercial use, such risks should be compared to the health and environmental risks of not releasing a technology. Status quo is not kind to millions of starving children and failure to act now will further deteriorate the environment and make food very expensive for future generations.

Misguided anti-science ideology and failure by governments to prioritize agricultural and rural development in developing countries brought us the food crisis. The challenge we are facing is not whether the world resources are sufficient to feed us all now and in the future, but whether we will change our behavior.

## 4 When Cheap Water and Oil Disappear

Raj Patel is a fellow at the Institute for Food and Development Policy, and author of “Stuffed and Starved”.

The U.S. leads the world in genetically modified agricultural technology, yet one in eight Americans is hungry. Last year, with bumper harvests, more than a billion people ate less than 1,900 calories per day. The cause of hunger today isn't a shortage of food — it's poverty. Agriculture will need to be much more regionally controlled and locally adapted.

Addressing that will require not new agricultural technology, but a political commitment to making food a human right.

We do, however, need to transform the way we farm. Today's industrial agriculture depends on fossil fuels and abundant water. The growing and processing of food for the average American every year takes the equivalent of more than 500 gallons of oil. The future will see both cheap water and oil disappear.

So how should we farm tomorrow? To answer this, we'll need the very best independent and peer-reviewed science. In 2005, the World Bank's chief scientist, Robert Watson, brought together leading natural and social scientists, representatives from government (including the U.S.), private sector and non-governmental organizations to ask how we'd feed the world in 2050, when there will be nine billion of us.

Over three years, more than 400 experts worked on a sobering report which has recently been published as “Agriculture at a Crossroads.”

The scientists concluded that genetically modified crops had failed to show much promise in feeding the world. Instead, the study suggested that to feed the world, we need both political and technological change. Tomorrow's agriculture will need to be much more regionally controlled and locally adapted, and will need a diversity of approaches to meet the challenges of climate change and resource scarcity.

Among the farming techniques endorsed by the report is agroecology, which builds soil, insect and plant ecology. The result is a farming system that uses water frugally, sequesters vast amounts of carbon and doesn't require external inputs.

This is cutting edge science, but it isn't terribly profitable for large U.S.-based agricultural corporations. Perhaps that explains why, despite strong support for this report among governments overseas, the U.S. government last year refused to endorse it.

## 5 The Third Way

Jonathan Foley is the director of the new Institute on the Environment at the University of Minnesota. His research is focused on global land use, agriculture and climate.

The future of agriculture must address several goals simultaneously. First, it now appears that we will have to double world food production in the next 40 years given continued population growth, increasing meat consumption and pressure from biofuels. You're either with Michael Pollan or you're with Monsanto, but neither paradigm can fully meet our needs.

We will also have to dramatically reduce the environmental impacts of our farming practices,

which have caused widespread damage to soils, ecosystems, watersheds and even the atmosphere. In fact, agriculture's impacts rival climate change as a top environmental concern.

We will also have to improve food security for the world's poor. While the Green Revolution of the 1960s made it possible to feed hundreds of millions more people than in earlier eras, the number of undernourished in the world has started to rise again.

Finally, we will have to increase the resilience of agriculture. Today, our high-efficiency, globalized world has many benefits, but it is vulnerable to disruption, whether from drought, disease or price spikes. We must start building more resilience into food systems to better insulate us from future shocks.

Currently, there are two paradigms of agriculture being widely promoted: local and organic systems versus globalized and industrialized agriculture. Each has fervent followers and critics. Genuine discourse has broken down: You're either with Michael Pollan or you're with Monsanto. But neither of these paradigms, standing alone, can fully meet our needs.

Organic agriculture teaches us important lessons about soils, nutrients and pest management. And local agriculture connects people back to their food system. Unfortunately, certified organic food provides less than 1 percent of the world's calories, mostly to the wealthy. It is hard to imagine organic farming scaling up to feed 9 billion.

Globalized and industrialized agriculture have benefits of economic scalability, high output and low labor demands. Overall, the Green Revolution has been a huge success. Without it, billions of people would have starved. However, these successes have come with tremendous environmental and social costs, which cannot be sustained.

Rather than voting for just one solution, we need a third way to solve the crisis. Let's take ideas from both sides, creating new, hybrid solutions that boost production, conserve resources and build a more sustainable and scalable agriculture.

There are many promising avenues to pursue: precision agriculture, mixed with high-output composting and organic soil remedies; drip irrigation, plus buffer strips to reduce erosion and pollution; and new crop varieties that reduce water and fertilizer demand. In this context, the careful use of genetically modified crops may be appropriate, after careful public review.

A new "third way" for agriculture is not only possible, it is necessary. Let's start by ditching the rhetoric, and start bridging the old divides. Our problems are huge, and they will require everyone at the table, working together toward solutions.

## **6 Declining Yields on the Horizon**

Michael J. Roberts is an assistant professor of agricultural and resource economics at North Carolina State University. He is the writer of the Greed, Greens and Grains blog.

About 30 years ago Julian Simon, an economist, made a famous bet with Paul Ehrlich, the entomology professor and author of "The Population Bomb." The bet was about the future direction of resource prices.

The green revolution came from public investments in crop science, not the wondrous market.

Where Mr. Ehrlich saw population growth leading to scarcity in resources and higher prices, Mr. Simon saw an impending resource boom that would easily compensate for population growth. Mr. Simon handily won the bet.

Staple commodity prices — from food to oil to metals — have all trended flat or downward over the long run. Technological optimists point to this fact and believe resource scarcity is of little concern to our post-industrial society. In a sense, they're right. But what about the part of the world that isn't industrialized?

I am mindful of arguments coming from technological optimists who believe crop yields will continue to rise, that there is plenty of oil still left to find and that geo-engineering will solve global warming.

But I don't think today's doomsayers are a few voices in small corners of the scientific community. There is a real threat to worldwide food security over the next 10 to 40 years. The threat comes from global income inequality combined with projected global warming, which could cause tremendous declines in crop yields.

For the United States — by far the world's largest producer and exporter of food commodities — my own statistical research with Wolfram Schlenker predicts yield declines of 18 percent to 35 percent for corn and soybeans due to global warming, and more than twice these losses by the end of this century.

A recent, far more comprehensive study by the International Food Policy Research Institute predicts large food production declines and higher prices for the whole world.

For people in the United States these dramatic predictions are actually of little direct concern. Raw commodities make up such a tiny share of retail food prices we would hardly notice a 10-fold increase in corn prices. The price of a quarter-pound hamburger (produced from corn-fed beef) would probably go up by less than a dollar. It's hard to believe we'd buy much less meat as a result. Indeed, demand growth today comes less from population growth and more from rising incomes and meat consumption in China. (Keep in mind that it takes five to 10 calories of staple grains to make one calorie of meat.)

But three billion people — nearly half the planet — live on \$2.50 per day or less. The poor typically spend a third to half of their income on food, composed mainly of staple commodities. If food quantities go down and prices go up, it's the world's poor who consume less.

If incomes were more equal around the world, prices would rise much further and we would buy less meat, but there would be little risk of famine.

Still, it could be that new genetically modified seeds will accelerate yield growth and offset projected damages from global warming. So far, genetically modified crops have shown yield gains in developing nations, but only modest gains in rich countries. And though yields have grown, my research shows no growth in tolerance to extreme heat, which is the key challenge going forward.

The green revolution didn't come about from a wondrous market. It came from public investments in crop science that people like Norman Borlaug then spread around the world. But public funding of crop science research has diminished over the years. Now seems like a good time to increase that kind of investment.

<http://roomfordebate.blogs.nytimes.com/2009/10/26/can-biotech-food-cure-world-hunger/?th&emc=th#jonathan>

Copyright 2009 The New York Times Company  
NYTimes.com 620 Eighth Avenue New York, NY 10018