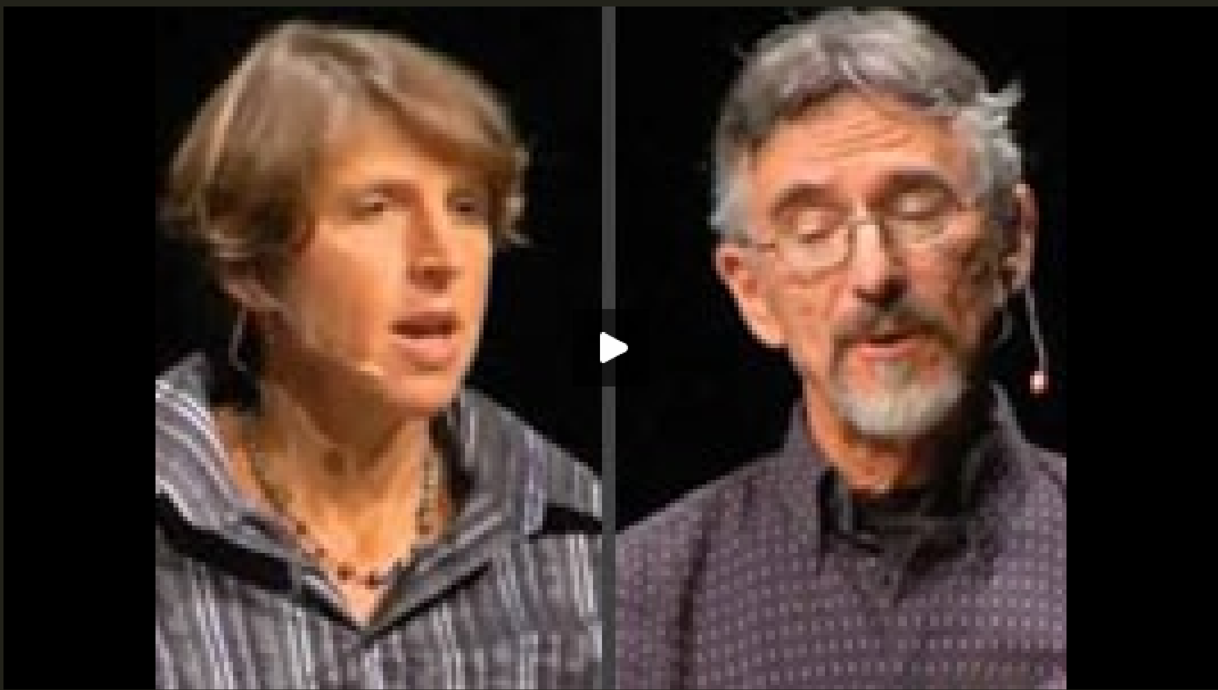
Seminars About Long-term Thinking

A monthly Seminar series, hosted by Stewart Brand



Filmed on Tuesday July 28, 02009

Raoul Adamchak, Pamela Ronald

Organically Grown and Genetically Engineered: The Food of the Future

Engineered organic

Organic farming teacher Raoul began the joint presentation with a checklist for truly sustainable agriculture in a global context. It must:

Provide abundant safe and nutritious food.... Reduce environmentally harmful inputs.... Reduce energy use and greenhouse gases…. Foster soil fertility…. Enhance crop genetic diversity…. Maintain the economic viability of farming communities…. Protect biodiversity…. and improve the lives of the poor and malnourished. (He pointed out that 24,000 a day die of malnutrition worldwide, and about 1 billion are undernourished.)

Organic agriculture has made a good start on these goals, he said, with its focus on eliminating harmful pesticides, soluble synthetic fertilizers, and soil erosion. Every year in the world 300,000 deaths are caused by the pesticides of conventional agriculture, along with 3 million cases of harm. Organic farmers replace the pesticides with crop rotation, resilient varieties of plants, beneficial insects, and other techniques.

But organic has limitations, he said. There are some pests, diseases, and stresses it can't handle. Its yield ranges from 45% to 97% of conventional ag yield. It is often too expensive for low-income customers. At present it is a niche player in US agriculture, representing only 3.5%, with a slow growth rate suggesting it will always be a niche player.

Genetically engineered crops could carry organic farming much further toward fulfilling all the goals of sustainable agriculture, Raoul said, but it was prohibited as a technique for organic farmers in the standards and regulations set by the federal government in 2000.

At this point plant geneticist Pam took up the argument. What distinguishes genetic engineering (GE) and precision breeding from conventional breeding, she said, is that GE and precision breeding work with just one or a few well-characterized genes, versus the uncertain clumps of genes involved in conventional breeding. And genes from any species can be employed.

That transgenic capability is what makes some people nervous about GE causing unintended harm to human or ecological health. One billion acres have been planted so far with GE crops, with no adverse health effects, and numerous studies have showed that GE crops pose no greater risk of environmental damage than conventional crops.

Genetic engineering is extremely helpful in solving some agricultural problems, though only some. Pam gave three examples, starting with cotton. About 25% of all pesticide use in the world is used to defeat the cotton bollworm. Bt cotton is engineered to express in the plant the same caterpillar-killing toxin as the common soil bacteria used by organic farmers, *Bacillus thuringiensis*. Bt cotton growers use half the pesticides of conventional growers. With Bt cotton in China, cases of pesticide poisoning went down by 75%. India's cotton yield increased by 80%. Pam pointed out that any too-successful technique used alone encourages pests to evolve around the technique, so the full panoply of "integrated pest management" needs always to be employed.

Her second example was papayas in Hawaii, where the entire industry faced extinction from ringspot virus. A local genetic engineer devised way to put a segment of the virus genome into papayas, thereby effectively inoculating the fruit against the disease. The industry was saved, and most of the papayas we eat in California are GE.

Rice is Pam's specialty at her lab in Davis. Half the world depends on rice. In flood-prone areas like Bangladesh, 4 million tons of rice a year are lost to flooding—enough to feed 30 million people. She helped engineer a flood-tolerant rice (it can be totally submerged for two weeks) called Sub1. At field trials in Asia farmers are getting three to five times higher yield over conventional rice.

The cost of gene sequencing and engineering is dropping rapidly (toward $70 a genome), and our knowledge about how food crops function genetically is growing just as rapidly. That accelerating capability offers a path toward truly sustainable agriculture on a global scale.

Returning to the stage, Raoul doubted that certified organic farmers would ever be allowed to use GE plants, and so he proposed a new certification program for "Sustainable Agriculture," that would include GE.

--Stewart Brand

Seminar Sponsors

Will Hearst • David and Abby Rumsey • Kim Polese • Shel Kaphan • Garrett Gruener • Stream Guys Media Streaming • The Libra Foundation • Peter Baumann • Brian Eno • Greg Stikeleather • Richard and Angie Thieriot • Nion McEvoy • Cameo Wood • Susie Tompkins Buell Fund • Panta Rhea Foundation • Patrick Tufts • Ping Fu • Peter Schwartz • The Gordon and Betty Moore Foundation • Dean Ornish • The Long Now Membership

We would also like to recognize George Cowan (01920 - 02012) for being the first to sponsor this series.

Would you like to be a featured Sponsor?