



Sustainable Agriculture: The Key to Health & Prosperity

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Rethinking Agriculture in a Warming Climate

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I am growing increasingly convinced that we have to think well out of the box. We need to think about new crops, new methods, even new systems. And I'm going to just throw a few examples out. Desert agriculture and saline agriculture are at the moment not front and center in our agriculture, but there are institutions around the world that do research on both desert and saline agricultural systems. That is, growing crops that can tolerate high temperatures and salt. Several of the research centers are members of the CGIAR system, particularly ICRISAT and ICARDA, focus heavily on dryland agriculture.

The country that has focused most seriously on desert agriculture and been quite successful is Israel, investing in both research and on the production side.

Aquaculture has to be part of the answer. Here is some really startling numbers. A kilogram of fish can be raised with as little as 10 to 50 liters of water, depending of course on the source of the feed, and that water can be recycled. It takes in round

numbers about a thousand liters of water to grow a kilogram of wheat, and around the world we feed almost half of our grain to animals. which use most of the grain to power their own existence. So if you look at the amount of water that it takes to raise a kilogram of hamburger, it's somewhere between 5 and 10 times as much as it takes to make a kilogram of grain.

Thus making better use of what will be most abundant—sunshine, saltwater, and desert—is extremely important. But there's another aspect at the heart of making agriculture more sustainable, and that's closing the nutrient loop between animals and plants. So for example, integrated aquaculture and agriculture systems have been developed on land, in the oceans and in fact in desert areas, using a variety of aquaculture combinations of aquaculture and agriculture, including halophyte agriculture.

I think we need to invest more in such closed systems because many of the problems that we have created with our modern high efficiency agriculture that have to do with the flow of nutrients that are not used by plants—that is, fertilizer and the fertilized contamination of water and the problems of recycling the wastes that are produced by animal agriculture.

In sum, I think that improving both the productivity and environmental sustainability of food production in a changing climate is among the most profound challenges facing face humanity in the 21st century. Thank you.

REPORTER: Hello. I'm wondering if you looked into the crops quinoa which is I believe drought-tolerant.

F: Yes.

REPORTER: And salicornia which is saline-tolerant.

F: Actually, the last slide I showed is one that I got from the Seawater Foundation, and they really have developed salicornia. In fact it's one of the major—that's a point I didn't make—it's one of the major hopeful crops for biofuels. It really does make a high quality oil. There's a lot of reading to do. There's some molecular biology to do. But I think that, together with mangroves as carbon sinks and inland waterways could really make a huge difference in the most arid parts of the world.