

Can Sustainable Agriculture Feed the World?

Adapted from information provided by the U.S. Working Group on the Food Crisis.

With the global population projected to grow to 9 billion by 2050, many people wonder if small-scale, organic agriculture can really feed the world. Won't science be needed to successfully produce enough food for everyone?

The answer to both questions is YES – however the science may look different than what many people expect.

Many have been told that the only way we'll be able to feed the growing population is through the science of genetically modified (GM) crops, chemical pesticides and fertilizers. But the latest scientific studies have discovered the opposite. Recent studies have concluded that:

Diverse, local, family farms that work with nature will ultimately prove to be the most effective in feeding the world in a sustainable manner.

The science of sustainable agriculture is called agroecology. Agroecology joins modern scientific methods with local farming knowledge to build diverse and productive systems without relying on expensive seeds and chemicals. Below are some of the most recent studies that have concluded that agroecology is one of the most viable and promising methods available for feeding the world:

- The 2008 groundbreaking *International Assessment of Agricultural Knowledge, Science, and Technology for Development* (known as the IAASTD). was sponsored by the World Bank, five United Nations agencies, and conducted by over 400 scientists and development experts from more than 80 countries. The report's results have been endorsed by 58 countries.

“Business as usual is not an option,” was one of the major findings of the Assessment. It concluded that conventional industrial agriculture has significantly degraded the world's soils and other natural resources, and now threatens water, energy, and climate security. The report warns that expensive, short-term fixes – including GM crops – are not likely to reduce long-term hunger and poverty, and could even worsen environmental and social problems in many communities. In contrast, the Assessment concluded that agroecology shows promise for ending hunger over both the near and long term.

- *The Environmental Food Crisis* a 2009 report by the UN Environment Programme, further confirms IAASTD findings. It predicts further food crises due to environmental collapse and recommends strong support for sustainable agriculture on small family farms.
- A 2007 study by the University of Michigan, comparing data from almost 100 studies of conventional and sustainable agriculture, concluded that a worldwide switch to organics could actually increase global food production by as much as 50% – enough to feed a population of 9 billion people without any additional land. And this research is not new: a 2003 peer-reviewed analysis of 208 projects (with almost 9 million farmers) in over 50 developing countries found a 93% increase in food production when farmers switched to sustainable methods.¹

Agriculture & Climate Change

There is also much evidence to show that organic agriculture helps farmers adapt to and resist climate change. After Hurricane Mitch devastated Central America in the late 1990s, researchers found that farmers using sustainable methods lost less money and less soil in the disaster, and were able to recover faster than their conventionally farming neighbors.²

Both the *USDA and the Intergovernmental Panel on Climate Change* have also noted the ability of organic methods to store carbon in the soil, which decreases the amount of carbon dioxide in the atmosphere. The increase in soil organic matter and complex soil structure on organic farms also supports improved water and moisture retention as well as drainage, enabling farmers to adapt to a variety of climate-related stresses (including droughts and floods). In contrast, industrial agriculture is responsible for a high level of greenhouse gas emissions, largely associated with petrochemical (fertilizer, pesticide) production, use and application; intensive livestock operations; and land use conversion (deforestation and turning grasslands into – for example – large scale soybean, palm and livestock production). The intensive use of chemical fertilizers also destroys soil biota and reduces organic matter, thereby destroying the natural capacity of healthy agroecosystems to store carbon and mitigate climate change.

Recent research by the *Union of Concerned Scientists titled Failure to Yield* concludes that GM crops do not significantly increase yields. The report finds that most of the major yield increases in the last 20 years were due to conventional breeding – that is, crossing different varieties of one species together, not genetic modification which involves injecting genes from one species into another.³ Evidence reported in the IAASTD also indicates highly inconsistent yield gains as well as yield declines and in some instances, near-total yield failures, associated with GM crops.⁴

Agriculture in Africa

Nowhere does the problem of hunger and poverty seem more dire than in Africa. Can small-scale organic agriculture work in Africa? The answer is yes.

A 2008 study, *Organic Agriculture and Food Security in Africa* conducted by the UN Conference on Trade and Development and Environment Programme, analyzed 15 organic agriculture programs in East Africa. It found that, “organic agriculture can be

more conducive to food security in Africa than most conventional production systems,” and “it is more likely to be sustainable in the long term.” The study found that the conversion from traditional low chemical input farming to full organic practices did not result in loss of productivity – in fact, as the organic farms became more established, they out-produced traditional farms and matched the productivity of conventional farms that rely on fertilizers and other chemical inputs.

Summary

All of these findings point towards a promising and very productive future based on agroecology. The studies may even underestimate the full potential of this path, given that so little relative funding has gone towards the research. Yet, rather than increasing investment in small-scale organic agriculture, the US government, the Gates Foundation, and others who comprise the Alliance for Green Revolution in Africa are instead setting the stage for major investment in more transgenic biotechnologies – a strategy that scientific evidence is showing to be ineffective. Not only is investment in these technologies unlikely to improve yield or support farmers’ ability to cope with highly variable climatic conditions, these choices divert scarce and much-needed resources away from the science, technologies and innovations that have been proven to work.

Scientific evidence has provided us an answer to the question: Can sustainable agriculture feed the world? Yes. The evidence also clearly points towards the need for further investment in strategies that address the underlying causes of hunger and poverty, which have less to do with yields and more to do with access to resources. To overcome these challenges, we need policies and investments that support rural education, ecological and place-based learning; local and community control of seeds and growing methods; access to arable land; and local markets and fair global trade arrangements.

- ¹ Pretty J, Noble A D, Bossio D, Dixon J, Hine R E, Penning de Vries F W T and Morison J I L. 2005. Resource-conserving agriculture increases yields in developing countries. *Environmental Science & Technology* 40(4), 1114-1119
- ² Holt-Gimenez, Eric. "Measuring farmers' Agroecological Resistance after Hurricane Mitch in Nicaragua: a Case Study in Participatory, Sustainable Land Management Impact Monitoring" in *Agriculture, Ecosystems and Environment* 93 (2002), 87-105.
Borron, Sarah. "Building Resistance for an Unpredictable Future: How Organic Agriculture can help farmers adapt to climate change" Rome: FAO. August 2006.
- ³ Gurian-Sherman, Doug. *Failure to Yield: Evaluating the Performance of Genetically Engineered Crops* Union of Concerned Scientists March 2009
- ⁴ Heinemann, Jack. *Hope not Hype: The Future of Agriculture Guided by the International Assessment on Agricultural Knowledge Science and Technology for Development*. 2008.