Organic Agriculture Can Feed the World

by Andre Leu

Several high-profile advocates of conventional agricultural production have stated that the world would starve if we all converted to organic agriculture. They have written articles for science journals and other publications saying that organic agriculture is not sustainable and produces yields that are significantly lower than conventional agriculture.

Thus, the push for genetically modified organisms, growth hormones, animal-feed antibiotics, food irradiation and toxic synthetic chemicals is being justified, in part, by the rationale that without these products the world will not be able to feed itself.

Ever since Thomas Malthus wrote *An Essay on the Principle of Population* in 1798 and first raised the specter of overpopulation, various experts have been predicting the end of human civilization because of mass starvation.

The theme was popularized again by Paul Ehrlich in his 1968 book, *The Population Bomb.* According to Ehrlich's logic, we should all be starving now that the 21st century has arrived: "The battle to feed all of humanity is over. In the 1970s the world will undergo famines; hundreds of millions of people are going to starve to death in spite of any crash programs embarked upon now."

The only famines that have occurred since 1968 have been in African countries saddled with corrupt governments, political turmoil, civil wars and periodic droughts. The world had enough food for these people — it was political and logistical events that prevented them from producing adequate food or stopped aid from reaching them. Hundreds of millions of people did not starve to death.

The specter of mass starvation is being pushed again as the motive for justifying GMOs. In June 2003, President Bush stated at a biotechnology conference, "We should encourage the spread of safe, effective biotechnology to win the fight against global hunger."

We must now ask ourselves: Is global hunger due to a shortage of food production?

In this first decade of the 21st century, many farmers around the world are facing a great economic crisis of low commodity prices. These low prices are due to oversupply. Current economic theories hold that prices decrease when supply is greater than demand.

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Most of our current production systems are price driven, with the need for economies of scale to reduce unit costs. The small profit margins of this economic environment favor enterprises working in terms of large volume, and as a result the family farm is declining. Many areas of the United States and Australia have fewer farmers now than 100 years ago, and the small rural centers they support are disappearing. Hundreds of thousands of farmers have had to leave their farms in Argentina due to higher production costs and lower commodity prices. The sugar industry in Australia is on the verge of collapse for the same reason. Australian dairy farmers continue to leave the industry since deregulation forced down the prices they receive. Most of the major industrial countries are subsidizing their farmers so that their agricultural sectors do not collapse.

Europe, North America, Australia and Brazil are in the process of converting a large percentage of their arable land from food production to biofuels such as ethanol in an effort to establish viable markets for their farmers. The latest push in GMO development is BioPharm, in which plants such as corn, sugarcane and tobacco are modified to produce new compounds such as hormones, vaccines, plastics, polymers and other non-food compounds. All of these developments will mean that less food is grown on some of the world's most productive farmland.

Grain farmers in India have protested about cheap imports that are sending them deeper into poverty. Countries such as India and China, once considered as overpopulated basket cases, export large quantities of food. In fact, India, one of the world's most populated countries, is a net food exporter in most years.

South American rainforests are cleared for pasture that is grazed with beef destined for the hamburger chains of North America. Once the soil is depleted, new areas are cleared for pasture and old, degraded areas are abandoned to weeds. In Asia, most of the forests are cleared for timber that is exported to the developed industrial economies. One of the saddest

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things about this massive, wasteful destruction of biodiversity is that very little of the newly cleared land is used to feed the poor. Most of this production of timber and beef is exported to the world's richest economies.

The reality is that the world produces more than enough food to feed everyone and has more than enough suitable agricultural land to do it. Unfortunately, due to inefficient, unfair distribution systems and poor farming methods, millions of people do not receive adequate nutrition.

Can organic agriculture feed the world?

Organic agriculture needs to be able to answer two major questions:

1. Can organic agriculture produce high yields?

2. Can organic agriculture get the food to the people who need it?

An editorial in *New Scientist* for February 3, 2001, stated that low-tech, sustainable agriculture is increasing crop yields on poor farms across the world, often by 70 percent or more. This has been achieved by replacing synthetic chemicals with natural pest control and natural fertilizers.

Professor Jules Pretty, director of the Centre for Environment and Society at the University of Essex, wrote, "Recent evidence from 20 countries has found more than 2 million families farming sustainably on more than 4-5 million hectares. This is no longer marginal. It cannot be ignored. What is remarkable is not so much the numbers, but that most of this has happened in the past 5-10 years. Moreover, many of the improvements are occurring in remote and resource-poor areas that had been assumed to be incapable of producing food surpluses."

An excellent example of this type of agricultural extension has been published in the January 2003 *World Vision News.* Working in conjunction AusAID, World Vision linked farmers from the impoverished Makuyu community in Kenya with the Kenya Institute of Organic Farming (KIOF).

They arranged workshops where KIOF members taught the principles of organic farming, including compost making, preparing safe organic pesticides, organic vegetable gardening and organic care of livestock.

Maize yields increased by four to nine times. The organically grown crops produced yields that were 60 percent higher than crops grown with expensive chemical fertilizers.

The wonderful thing is that many of these farmers now have a surplus of food to sell, whereas previously they did not even have enough to eat. They are organizing marketing co-ops to sell this surplus.

The profits are going back to the community. They have distributed dairy goats, rabbits, hives and poultry to community members and have planted 20,000 trees, including 2,000 mangos. Several of the organic farmers are training many other farmers in the district and helping them to apply organic farming techniques to their farms.

The mood of the community has changed. They are now confident and empowered with the knowledge that they can overcome the problems in their community.

These types of simple, community-based organic agricultural models are what is needed around the world to end rural poverty and starvation, not GMOs and expensive toxic chemicals.

The Makuyu community in Kenya is not an isolated example. Professor Pretty gives other examples from around the world of increases in yield when farmers have replaced synthetic chemicals and shifted to sustainable/organic methods:

• 223,000 farmers in southern Brazil using green manures and cover crops of legumes and livestock integration have doubled yields of maize and wheat to 4-5 tons/hectare.

• 45,000 farmers in Guatemala and Honduras used regenerative technologies to triple maize yields to 2-2.5 tons/ha and diversify their upland farms, which has led to local economic growth that has in turn encouraged remigration back from the cities.

• 200,000 farmers across Kenya as part of sustainable agriculture programs have more than doubled their maize yields to about 2.5 to 3.3 tons/ha and substantially improved vegetable production through the dry seasons.

• 100,000 small coffee farmers in Mexico have adopted fully organic production methods and increased yields by half.

• A million wetland rice farmers in Bangladesh, China, India, Indonesia, Malaysia, Philippines, Sri Lanka, Thailand and Vietnam have shifted to sustainable agriculture, where group-based farmer field schools have enabled farmers to learn alternatives to pesticides and increase their yields by about 10 percent.

Nicolas Parrott of Cardiff University, U.K., authored a report entitled *The Real Green Revolution.* He gives case studies that confirm the success of organic and agroecological farming techniques in the developing world:

• In Madhya Pradesh, India, average cotton yields on farms participating in the Maikaal Bio-Cotton Project are 20 percent higher than on neighboring conventional farms.

• In Madagascar, SRI (System of Rice Intensification) has increased yields from the usual 2-3 tons per hectare to yields of 6, 8 or 10 tons per hectare.

• In Tigray, Ethiopia, a move away from intensive agrochemical usage in favor of composting has produced an increase in yields and in the range of crops it is possible to grow.

• In the highlands of Bolivia, the use of bonemeal and phosphate rock and intercropping with nitrogen-fixing lupin species have significantly contributed to increases in potato yields.

One of the most important aspects of the teaching farmers in these regions to increase yields with sustainable/organic methods is that the food and fiber is produced close to where it is needed and in many cases by the people who need it. It is not produced halfway around the world, transported, and then sold to them.

Another important aspect is the low input costs. Growers do not need to buy expensive imported fertilizers, herbicides and pesticides. The increase in yields also comes with lower production costs, allowing a greater profit to these farmers.

Third, the substitution of more labor-intensive activities such as cultural weeding, composting and intercropping for expensive imported chemical inputs provides more employment for local and regional communities. This employment allows landless laborers to pay for their food and other needs.

As in the example of the Makuyu community in Kenya, these benefits lead to a

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positive change in the wealth and the mood of the community. These communities are revitalized, proactive and empowered to improve their future.

Can organic agriculture achieve high yields in developed nations?

Since 1946, the advent of chemical fertilizers, pesticides, herbicides, improved crop varieties and industrial paradigms are credited with producing the high yields of the "green revolution." Because organic agriculture avoids many of these new inputs, it is assumed that it always results in lower yields.

The assumption that greater inputs of synthetic chemical fertilizers and pesticides are required to increase food yields is not accurate. In a study published in *The Living Land,* Professor Pretty looked at projects in seven industrialized countries of Europe and North America. He reported, "Farmers are finding that they can cut their inputs of costly pesticides and fertilizers substantially, varying from 20 to 80 percent, and be financially better off. Yields do fall to begin with (by 10 to 15 percent, typically), but there is compelling evidence that they soon rise and go on increasing. In the USA, for example, the top quarter of sustainable agriculture farmers now have higher yields than conventional farmers, as well as a much lower negative impact on the environment."

Professor George Monbiot, in an article in the *Guardian* (August 24, 2000), wrote that wheat grown with manure has produced consistently higher yields for the past 150 years than wheat grown with chemical nutrients, in U.K. trials.

A study of apple production conducted by Washington State University compared the economic and environmental sustainability of conventional, organic and integrated growing systems in apple production. The organic system had equivalent yields to the other systems. The study also showed that the break-even point was nine years after planting for the organic system and 15 and 16 years, respectively, for conventional and integrated farming systems.

In an article published in the peer-review scientific journal *Nature,* Laurie Drinkwater and colleagues from the Rodale Institute showed that organic farming had better environmental outcomes as well as similar yields of both products and profits when compared to conventional, intensive agriculture.

Gary Zimmer, one of the American pioneers of biological farming, runs an organic dairy farm with his son in Wisconsin. In 2000 one of his remineralized alfalfa (lucerne) fields produced a yield four times greater than the average for the district. He has increased the nutrient value of pasture by 300 percent and currently calves 150 cows every year without a single health problem.

Dick Thompson, a founding member of the Progressive Farmers of Iowa, engages in organic farm research in conjunction with the University of Iowa, the Rodale Institute and the Wallace Institute. He obtains some of the highest yields in his district using composts, ridge-tilling and crop rotations.

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The innovative system of rotationally grazing several species of animals developed by Joel and Theresa Salatin of Polyface Farm in Virginia is one of the best examples of a high-yield organic system. They use 100 acres of dryland pasture to cell-graze cattle, sheep, pigs, meat chickens, laying hens, turkeys, pheasants and rabbits.

Their system is based on native pastures, without cultivation or new, "improved" pasture species. The only input has been the feed for the poultry. This multi-species rotational grazing system builds one inch of soil a year and returns the family 15 times the income per acre than is received by neighbouring farms using a set stocking of cattle.

Steve Bartolo, president of the Australian Organic Sugar Producers Association, produced similar yields of commercial sugar per hectare from his organic Q124 cane and his conventional cane in 2002. The average yield of sugar for his best organic cane "achieved higher tonnes per hectare compared to the average of all conventionally grown Q124."

Greg Paynter, an organic farmer who works for the Queensland Department of Primary Industries, conducted the organic section of grain comparison trials at Dalby Agricultural College in 2002. The organic wheat produced 3.23 tonnes to the hectare compared to the conventional wheat yield of 2.22 tonnes. This trial was conducted during one of the worst droughts on record.

Graham McNally of Kialla Farms, one of Australia's significant organic pioneers, consistently achieves yields comparable to those of the conventional farms in his region.

Dr Rick Welsh of the Henry A. Wallace Institute reviewed numerous academic publications comparing organic and conventional production systems in the United States. The data showed that the organic systems were more profitable. This profit was not always due to premiums, but was instead a result of lower production and input costs as well as more consistent yields. Dr. Welsh's study also showed that organic agriculture produces better yields than conventional agriculture in adverse weather events, such as droughts or higher-than-average rainfall.

Will GMOs feed the world?

Argentina is a good example of what happens when a country pursues the policies of market deregulation and GMO crops. It is the third-largest producer of GMO crops, with 28 percent of the world's production. By the 1999-2000 season, more than 80 percent of the total soybean acreage, or 6.6 million hectares, had been converted to GMOs. These are some of the results according to a study published by Lehmann and Pengue in the *Biotechnology and Development Monitor:*

• Declining profit margins — prices for soybeans declined 28 percent between 1993 and 1999.

• Farmers' profit margins fell by half between 1992 and 1999, making it difficult for many to pay off bank loans for machinery, chemical inputs and seeds.

• A 32 percent decrease in producers — between 1992 and 1997, the number of producers dropped from 170,000 to

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116,000, meaning 54,000 farmers were forced to leave the industry.

• At least 50 percent of the acreage is now managed by corporate agriculture.

• There is an increasing role of transnational companies in the agricultural sector.

• Industrialization of grain and soybean production has boosted dependence on foreign agricultural inputs and increased foreign debt.

• Removal of import tariffs led to the bankruptcy of domestic farm machinery manufacturers and a loss of employment.

• The commercial seed sector has become increasingly controlled by subsidiaries of transnational corporations.

Since the above data was published, the Argentinean economy collapsed, causing riots and the resignations of several governments. The country is now currently in deep debt, with its economy under the control of the International Monetary Fund and the World Bank. Its standard of living has declined, and thousands more farmers have been forced off their farms. Rural and urban poverty and hunger has increased.

According to Caritas Argentina, the social services agency of the Catholic Church in that country, over 40 percent of all Argentinean children are now undernourished: "World Health Organization standards for daily caloric intake are unmet for nearly 40 percent of Argentinean children under 18, and for up to half in the poorer northeast region of the country. Even in the comparatively wealthy capital city Buenos Aires, at least 19 children have died of malnutrition in recent months."

If GMOs cannot feed the children in the country that is the world's third-largest producer of GMO crops, how will they feed the rest of the world?

Conclusion: Organic agriculture *can* feed the world.

The data thus shows that it is possible to obtain very good yields using organic systems. This is not uniform at the moment, with many organic growers not yet producing at the levels that are achievable. Education on the best practices in organic agriculture is a cost-effective and simple method of ensuring high levels of economically, environmentally and socially sustainable production where it is needed.

Organic agriculture is a viable solution to preventing global hunger because:

- It can achieve high yields.
- It can achieve these yields in the areas where it is needed most.
- It has low inputs.
- It is cost-effective and affordable.
- It provides more employment so that the impoverished can purchase their own needs.
- It does not require any expensive technical investment.

It costs tens of millions of dollars and takes many years to develop *one* genetically modified plant variety. This money would be spent far more productively on organic agricultural education, research and extension in the areas where we need to overcome hunger and poverty.

Organic agriculture is the quickest, most efficient, most cost-effective and fairest way to feed the world.

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