

# Sustainable Agriculture is Productive

by Lim Li Ching

## 1. Introduction

Agriculture was one of the five priority sectoral issues identified by UN Secretary-General Kofi Annan as important for the World Summit on Sustainable Development (WSSD). Paragraph 38 of the (then) Draft Plan of Implementation recognizes agriculture's crucial role in addressing global population needs, and is commendably replete with references to sustainable agriculture and sustainability.

Yet, another model is still persistently promoted, that of agriculture based on industrial monoculture, high chemical inputs and genetically engineered crops. Whilst productive, this model has raised concerns due to over reliance on chemical pesticides, herbicides and fertilisers, reduced biodiversity, deterioration of soil and water quality, increased risk of crop disease, chemical residues in food and health risks to farm workers. Long-term ecological health (particularly biodiversity, water and topsoil quality) is thus exchanged for short-term productivity gains. Furthermore, genetically engineered crops could pose new risks to human health and the environment.

Critics of sustainable agriculture, particularly of organic agriculture, claim that models of intensive,

high-input, 'modern' agriculture are the main, if not the only, way that the food needs of a rising world population can be met. Whilst possibly recognising the social and environmental benefits of alternative farming methods, these are still deemed low-yielding and less efficient. However, there are many examples of sustainable agriculture demonstrating high yields.

## 2. What is Sustainable Agriculture?

Agriculture is sustainable when it is ecologically sound, economically viable, socially just, culturally appropriate, humane and based on a holistic scientific approach. Despite adequate global food production, many still go hungry because increased food supply does not automatically mean increased food security for all. What's important is who produces the food, who has access to the technology and knowledge to produce it, and who has the purchasing power to acquire it. Poor farmers cannot afford expensive 'modern' technologies that could theoretically increase yields. Sustainable agriculture must thus allow farmers to improve local food production with low-cost, readily available technologies and inputs, without causing environmental damage.

---

**TWN** THIRD WORLD NETWORK is a network of groups and individuals involved in bringing about a greater articulation of the needs, aspirations and rights of the people in the Third World and in promoting a fair distribution of world resources and forms of development which are humane and are in harmony with nature.

It must also be rooted in secure rights to land, water and other resources, including necessary credit and market.

### 3. High Productivity and Yields

The viability of sustainable agriculture has been demonstrated in a review of 208 projects and initiatives from 52 countries<sup>1</sup>. In these, some 8.98 million farmers have adopted sustainable agriculture practices on 28.92 million hectares in Africa, Asia and Latin America.

Farmers have achieved substantial increases in food production per hectare:

- 50-100% for rain-fed crops, though considerably greater in a number of cases
- 5-10% for irrigated crops.

Disaggregated data show:

- Average food production per household increased by 1.71 tonnes per year (up 73%) for 4.42 million small farmers growing cereals and roots on 3.58 million hectares.
- Increase in food production was 17 tonnes per year (an increase of 150%) for 146,000 farmers on 542,000 hectares cultivating roots (potato, sweet potato and cassava).
- Total production increased by 150 tonnes per household (an increase of 46%) for the larger farms in Latin America (average size 90 hectares).

Some specific examples of increased yields are as follows:

- Soil and water conservation in the drylands of Burkina Faso and Niger have transformed formerly degraded lands. The average family has shifted from being in cereal deficit of 644 kg per year (equivalent to 6.5 months of food shortage) to producing an annual surplus of 153 kg.
- Through the Cheha Integrated Rural Development Project in Ethiopia, some 12,500 households have adopted sustainable agriculture, resulting in a 60% increase in crop yields.
- Participatory irrigation management in the

Philippines has increased rice yields by about 20%.

- 45,000 families in Honduras and Guatemala have increased crop yields from 400-600 kg/ha to 2000-2500 kg/ha using green manures, cover crops, contour grass strips, in-row tillage, rock bunds and animal manures.

- The states of Santa Caterina, Paraná and Rio Grande do Sul in southern Brazil have focused on soil and water conservation using contour grass barriers, contour ploughing and green manures. Maize yields have risen from 3 to 5 tonnes/ha and soybeans from 2.8 to 4.7 tonnes/ha.

- The high mountain regions of Peru, Bolivia and Ecuador are some of the most difficult areas in the world for growing crops. Despite this, farmers have increased potato yields by three fold, particularly by using green manures to enrich the soil.

Other case studies of organic and agro-ecological practices show dramatic increases in yields as well as benefits to soil quality, and reduction in pests and diseases<sup>2</sup>. For example:

- In Brazil, use of green manures and cover crops increased maize yields by between 20-250%.
- In Tigray, Ethiopia, yields of crops from composted plots were 3-5 times higher than those treated only with chemicals.
- Yield increases of 175% were reported from farms in Nepal adopting agro-ecological practices.
- In Peru, restoration of traditional Incan terracing led to increases of 150% for upland crops.
- Projects in Senegal involving 2000 farmers, promoted stall-fed livestock, composting systems, green manures, water harvesting systems and rock phosphate. Yields of millet and peanuts increased dramatically by 75-195% and 75-165% respectively.
- In Honduras, soil conservation practices and organic fertilisers have tripled or quadrupled yields.
- Another example from Honduras is the mucuna bean, which improved crop yields on steep, easily eroded hillsides with depleted soils<sup>3</sup>. Farmers first

plant mucuna, which produces vigorous growth that suppresses weeds. When the beans are cut down, maize is planted in the resulting mulch. Subsequently, beans and maize are grown together. Very quickly, as the soil improves, yields are doubled, even tripled. The reason - mucuna produces 100 tonnes of organic material per hectare, creating rich, friable soils in 2-3 years. It also produces its own fertiliser, fixing atmospheric nitrogen (up to 150kg a hectare) and storing it in the ground for utilisation by other plants.

#### 4. Other Benefits Aplenty

Apart from the yield advantages listed above, sustainable agriculture adopted by the 208 projects in 52 countries and elsewhere has paved the way for many other benefits such as the following:

(a) As food supply increased, domestic consumption also increased, with direct benefits for health, particularly of women and children. Furthermore, despite the increase in domestic consumption, several projects reported surpluses being sold to local markets, and several reported surpluses and regional improvements to food production.

(b) 88% of the 208 projects made better use of locally-available natural resources and 92% improved human capital building through learning programmes. In more than half the projects, people were working together as groups.

(c) Most of the sustainable agriculture projects saw a reduction in soil erosion and an improvement in soil physical structure, organic matter content, and water holding capacity and nutrient balances. Productive farming, without destroying soils, by farmers along the Sahara's edge, in Nigeria, Niger, Senegal, Burkina Faso and Kenya, are further examples documented elsewhere. There, integrated farming, mixed cropping and traditional soil and water conservation methods increased per capita food production several fold<sup>4</sup>.

(d) Zero or minimal tillage, which resulted in better use of inputs, water retention, diverse rotations and break crops for weed control, spread quickly. It also cut erosion and water run-off, reducing water pollution.

(e) Many of the sustainable agriculture projects

#### Sustainable Agriculture

- makes best use of nature's goods and services by integrating natural, regenerative processes, e.g., nutrient cycling, nitrogen fixation, soil regeneration and natural enemies of pests
- minimises non-renewable inputs (pesticides and fertilisers) that damage the environment or harm human health
- relies on the knowledge and skills of farmers, improving their self-reliance
- promotes and protects social capital — people's capacities to work together to solve problems
- depends on locally-adapted practices to innovate in the face of uncertainty
- is multifunctional and contributes to public goods, such as clean water, wildlife, carbon sequestration in soils, flood protection and landscape quality.

reported large reductions in pesticide use following the adoption of integrated pest management. In Vietnam, farmers reduced the number of sprays from 3.4 to one per season, and in Sri Lanka from 2.9 to 0.5 per season.

(f) Pest control without pesticides reversed crop losses. In East Africa, maize and sorghum faced two major pests - stem borer and Striga, a parasitic plant. Field margins were planted with 'trap crops' such as Napier grass, which attracted stem borer larvae and killed them in the sticky substance it produced<sup>5</sup>. Crops were inter-planted with Desmodium, which repelled both pests.

(g) Planting a diversity of crops is beneficial, as has been proven by thousands of rice farmers in China who doubled yields and nearly eliminated its most devastating disease, rice blast, without chemicals or spending money<sup>6</sup>. Instead of planting large stands of one type of rice, as they typically have done, farmers planted a mixture of two different types: a standard rice that doesn't succumb to rice blast and valuable but very susceptible sticky rice. This radically restricted rice

blast because the disease-resistant plants blocked the fungus spore from travelling to susceptible plants.

## 5. Conclusion

Agriculture that is high-input and dependent on chemicals and genetic engineering allows a few corporations to wrest control over agriculture and ultimately food security, from farming communities. Such a model has to change.

Sustainable agriculture can deliver substantial increases in food production at low cost. It can be economically, environmentally and socially viable, and contributes positively to local livelihoods. There is thus an urgent need to concentrate effort, research, funds and policy support on proven sustainable agricultural practices, strengthening production by the poor themselves for local needs.

### References:

- 1 Jules Pretty and Rachel Hine (2001). 'Reducing Food Poverty with Sustainable Agriculture: A Summary of New Evidence'. Centre for Environment and Society, Essex University. [www2.essex.ac.uk/ces/ResearchProgrammes/CESOccasionalPapers/SAFErepSUBHEADS.htm](http://www2.essex.ac.uk/ces/ResearchProgrammes/CESOccasionalPapers/SAFErepSUBHEADS.htm)
- 2 Nicholas Parrott and Terry Marsden (2002). 'The Real Green Revolution: Organic and Agroecological Farming in the South'. London: Greenpeace Environment Trust. <http://www.greenpeace.org.uk/MultimediaFiles/Live/FullReport/4526.pdf>
- 3 Julian Pettifer. "'Magic Bean" Transforms Life for Poor Jacks of Central America'. *Independent*, Sunday, 10 June 2001.
- 4 Fred Pearce (2001). 'Desert harvest'. *New Scientist*, 27 October 2001, pp. 44-47.
- 5 Fred Pearce (2001). 'An Ordinary Miracle'. *New Scientist*, Vol. 169, Issue 2276, p.16.
- 6 Carol Kaesuk Yoon (2000). 'Simple Method Found to Vastly Increase Crop Yields'. *New York Times*, 22 August 2000.

---

(This paper first appeared as a Briefing Paper of the Third World Network for the World Summit on Sustainable Development (WSSD) held in July/August 2002.)

Lim Li Ching is a researcher with Third World Network and the Institute of Science in Society (ISIS).

## TWN BRIEFING PAPERS

**No.1** New Issues And New Round In The WTO

● Bhagirath Lal Das ● 2001 ● 4 pages

**No.2** Present Problems & Future Shape Of The WTO & The Multilateral Trading System

● Martin Khor ● 2001 ● 8 pages

**No.3** Some Suggestions For Modalities In Agriculture Negotiations

● Bhagirath Lal Das ● January 2003 ● 8 pages

**No.4** The Flexibility Myth: Why GATS Is A Bad Model For A New WTO Investment Agreement

● Peter Hardstaff ● May 2003 ● 4 pages

**No.5** Sustainable Agriculture: Critical Ecological, Social And Economic Issues

● Martin Khor ● June 2003 ● 6 pages

**No. 6** Foreign-Investment Regulation In Historical Perspective — Lessons For The Proposed WTO Agreement On Investment

● Ha-Joon Chang ● July 2003 ● 2 pages

**No.7** IPRS And Biodiversity — Stop The Theft Of Indigenous Knowledge

● Martin Khor ● July 2003 ● 4 pages

**No.8** Sustainable Agriculture Is Productive

● Lim Li Ching ● July 2003 ● 4 pages

**No.9** Pills, Patents And Profits — The Fight For Affordable Medicines For All

● Cecilia Oh ● July 2003 ● 4 pages

**No.10** Agriculture In The WTO: After The Chairman's Text

● Bhagirath Lal Das ● July 2003 ● 4 pages

**No.11** Services Negotiations In The WTO: Requests And Offers

● Bhagirath Lal Das ● July 2003 ● 4 pages