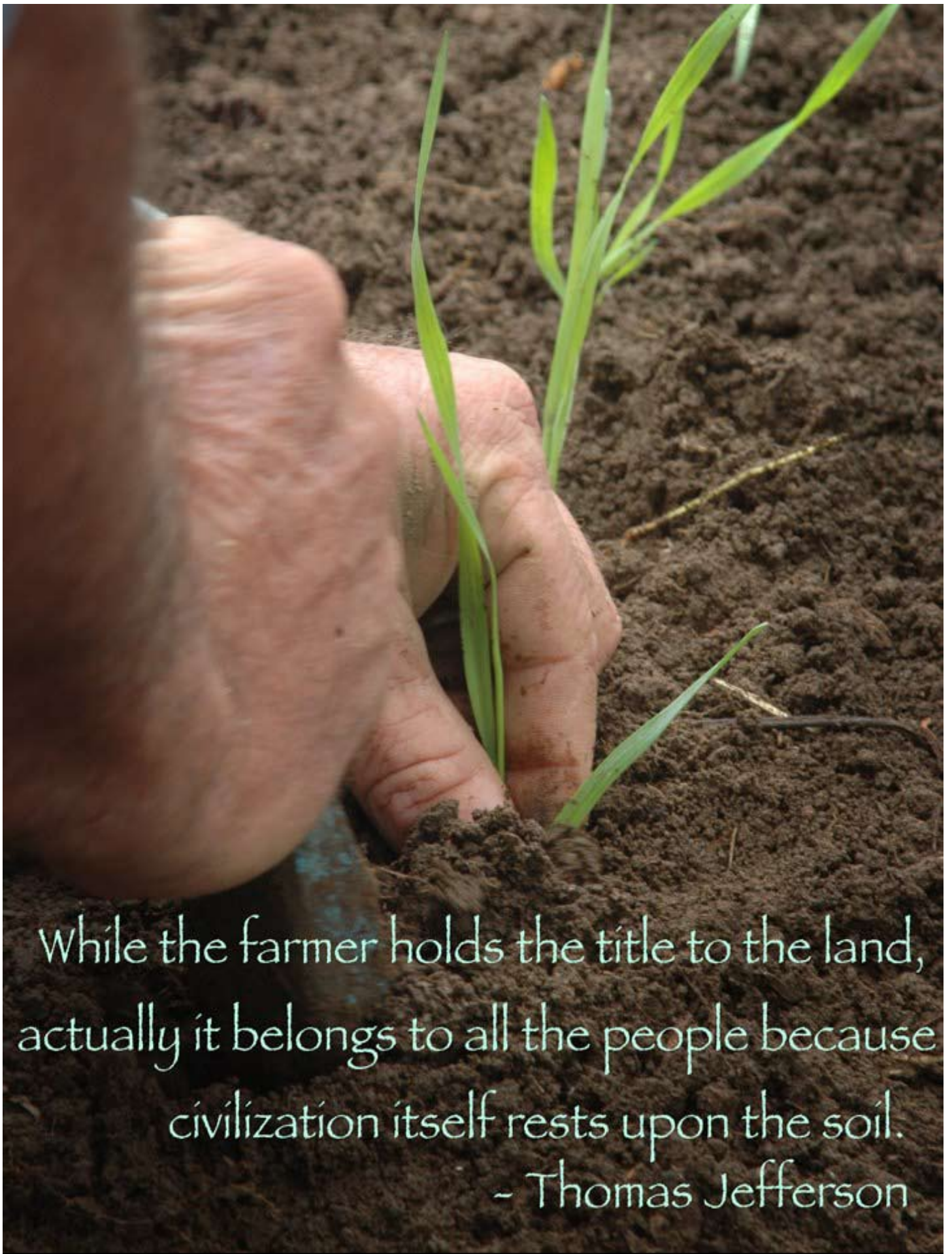


BIOINTENSIVE AGRICULTURE

~ A Greener Revolution ~





While the farmer holds the title to the land,
actually it belongs to all the people because
civilization itself rests upon the soil.
- Thomas Jefferson

“Much of the food produced in the Asia-Pacific region is produced by individual farmers, the majority of whom are small farmers. For long-term food security . . . consider providing active State support for the participation of small-scale food producers in a new green food revolution that gives high priority to revitalizing small-scale food production based on ecologically viable systems.”

– **UN-ESCAP:** Sustainable Agriculture and Food Security in Asia and the Pacific

BIOINTENSIVE AGRICULTURE

“India’s small-holder farmers (those owning less than 2.0 ha of farmland) comprise 78 percent of the country’s farmers, but own only 33 percent of the total cultivated land; they nonetheless produce 41 percent of the country’s food-grains. Their productivity is . . . higher than that of medium- and large-size farms. Moreover, their marketable surpluses are increasing. In the nation’s food-security interest, such increase must be sustained. Those features notwithstanding, small-holder families, together with the families of land-less agricultural workers, constitute the bulk of India’s hungry and poor.”

– **UN-FAO:** Smallholder Farmers in India: Food Security and Agricultural Policy

⌘ A Greener Revolution ⌘

“In Africa, a large proportion of the labour force is employed in agriculture (60–80 per cent) and the majority of these farmers (many of whom are women) are smallholders with farms of less than 2 hectares . . . Arguably, the most sustainable choice for agricultural development and food security is therefore to increase total farm productivity in situ, in the developing countries that are the most in need of greater food supplies. Attention must focus on the following:

- i) The extent to which farmers can improve food production and raise incomes with low cost locally-available technologies and inputs (this is particularly important at times of very high fuel and agro-chemical prices)*
- ii) Whether they can do this without causing further environmental damage. . . ”*

– **UNEP-UNCTAD:** Organic Agriculture and Food Security in Africa

“The next Green Revolution has to be greener than the first. It must be guided by small-holder farmers, adapted to local circumstances, and sustainable for the economy and the environment.”

–Bill Gates, World Food Prize Speech



“Improving the productivity, profitability, and sustainability of smallholder farming is the main pathway out of poverty in using agriculture for development.”

– World Bank: World Development Report 2008:
Agriculture for Development

THE WORLD IS CURRENTLY CONFRONTING A CRISIS IN AGRICULTURE

In 2009, the FAO estimated there to be over a billion hungry people in the world,¹ with another 2 billion suffering from malnutrition.² With an expanding global population, declining soil fertility, water scarcity and increasing costs for fuel and agri-chemicals, the question on the minds of farmers, scientists, and policy makers around the world is: how can we sustainably increase food production in a way that benefits the farmers, the economy and the environment?

SMALL-SCALE FARMERS CAN INFLUENCE THE OUTCOME

Smallholder farms – farms of 2 ha or less – are the most common type of farm in the world: out of 525 million farms worldwide, about 90% are smallholder farms.³ About 2.6 billion people in developing countries make their living from agriculture,⁴ and 1.5 billion of those people live on small farms – that’s almost one out of every four people in the world.⁵

Smallholders are the most productive farmers in the world, supplying more than half the global food supply from a small portion of the farmable land available.⁶ They are able to do this because they make the most efficient use of the land, and plant many different crops, rather than the monocultures favored by large-scale mechanized farming. Examples of small farm productivity include:

- Latin America, where farms averaging 1.8 ha represent about 30% of the cultivated land, but provide about 40% of the domestic agricultural output.⁷
- India, where 78% of the farmers are smallholders and produce 41% of the country’s grain on only 33% of the land.⁸
- Asia, where the majority of the more than 200 million rice farmers farm less than 2 ha, yet produce the bulk of the Asian rice crop.⁹
- Africa, where the 33 million small farms represent 80 percent of all farms in the region, and smallholders produce most of the food.¹⁰

However, according to the IAASTD, over 800 million of the poorest and hungriest people in the world live in smallholder communities.¹¹ Small increases in productivity could make a large difference in establishing food security and alleviating poverty in these places.

The usual method for increasing productivity has been to expand into new land when the old ceases to produce, but that is rapidly becoming impossible in developing countries, as the expanding population is already occupying almost all of the arable land.

Instead, recent reports from a wide range of international agencies, including the IAASTD, the World Bank, the UN-FAO and other UN agencies, advise that the best way to increase output for small farmers is to increase the productivity of the existing land under cultivation, rather than expanding into wild lands that provide balance for the agricultural systems.¹² They also agree that sustainable agriculture is the key to increasing productivity for the small farmers of the world. The question is, what is truly sustainable?



“The world. . . still faces a fundamental food security challenge. . . The great technological progress of the past half century has not led to major reductions in hunger and poverty in developing countries. . . the majority of the chronically hungry are small farmers in developing countries. . .”

– **UNEP-UNCTAD:**
Organic Agriculture and Food Security in Africa

SUSTAINABLE AGRICULTURE FOR THE SMALL FARMER AND THE WORLD

"Feeding over 6 billion people – and over 9 billion by 2050 – will require a wide range of creative, sustainable agricultural systems which not only provide food, but also factor in the economic value of nature-based services such as forests, wetlands, and soil organisms that underpin agriculture. Simply applying the "industrial" agricultural models of the twentieth century into the twenty-first as a single, global solution will not serve us well."

– **UNEP-UNCTAD: Organic Agriculture and Food Security in Africa**



According to the UN, sustainable agriculture can be defined as a system of agriculture involving a combination of inter-related soil, crop and livestock production practices; discontinuance or reduced use of external inputs that are potentially harmful to the environment and/or the health of farmers and consumers; and emphasis on the use of techniques that integrate and are adapted to local natural processes.¹³ The principles of this type of agriculture are:

- **Economic sustainability** through improved soil management and crop rotation which raises yields, reducing reliance on machinery, chemical fertilizer and pesticides.
- **Environmental sustainability** through protecting, recycling, replacing and maintaining the natural resources base such as land (soil), water and wildlife, and avoiding synthetic chemicals known to harm the environment, soil structure and biodiversity.
- **Social sustainability** through more extensive use of available labor, at least for some techniques, thus contributing to social justice and cultural cohesion.^{13,14}

In 2007, FAO official Nadia Scialabba stated that sustainable organic agriculture is: *"A holistic production management system that avoids the use of synthetic fertilizers and pesticides, and genetically modified organisms, minimizes pollution of air, soil and water, and optimizes the health of plants animals and people."* The benefits from this type of agriculture are its reliance on fossil-fuel independent, locally-available resources that incur minimal agro-ecological stresses and are cost-effective.¹⁵

Ecology Action believes that for an agricultural method to be considered sustainable, it should:

- **provide a nutritionally complete diet and a sufficient level of income;**
- **produce a large diversity of crops** for biodiversity and food security;
- **use as small an area as possible**, capitalizing on the established efficiency of small scale production;
- **use open-pollinated seeds**, placing ownership of seeds with farmers and communities, and encouraging adaptation of seeds to local needs;
- **use low-tech human powered tools** to minimize the need for economic capital and the use of natural capital (earth resources);
- **be usable to smallholder farmers** regardless of their economic status; and
- **be culturally acceptable**, and of a nature that can be passed on to future generations.

A sustainable agricultural method *should not*:

- **rely heavily on fertilizers or soil amendments** (including compost and manure) that cannot be produced by the farm itself;
- **rely on farm machinery;**
- **require non-renewable resources**, such as petroleum;
- **diminish the natural resources** available to the farmer, community or global community, but instead replenish them and, to the extent possible, enrich them.¹⁶

SMALL FARMERS ARE INNOVATORS

“Many countries tried to promote large-scale farming, believing that smallholder farming is inefficient, backward, and resistant to change. The results were unimpressive and sometimes disastrous. State-led efforts to intensify agricultural production in Sub-Saharan Africa, particularly in the colonial period, focused on large-scale farming, but they were not sustainable. In contrast, Asian countries that eventually decided to promote small family farms were able to launch the green revolution.”

—World Bank:

World Development Report 2008: Agriculture for Development



“Small-scale diversified farming is responsible for the lion’s share of agriculture globally. ... Small-scale farmers maximize return on land, make efficient decisions, innovate continuously and cause less damage to the environment than large farms.”

– IAASTD: Agriculture at a Crossroads

A CHALLENGE

Organic and near-organic agricultural methods and technologies are ideally suited for many poor, marginalized smallholder farmers... as they require minimal or no external inputs, use locally and naturally available material to produce high-quality products, and encourage a whole systemic approach to farming that is more diverse and resistant to stress."

–**UNEP-UNCTAD:** Organic Agriculture and Food Security in Africa

Organic agriculture is a step in the direction of sustainability; the same reports that encourage sustainability encourage organic production. However, whether organic methods are implemented using mechanized or manual labor can make a big difference in the outcome.

The yields of U.S. mechanized chemical agriculture and U.S. mechanized organic agriculture are approximately equivalent. Using either of these methods to raise all the food necessary to support the developing world, large scale or small scale, assuming a vegan diet (no animal products in the diet), would take 7000 square feet (2134 meters) per person.

However, if, as recommended by the previously mentioned reports, an appropriate quantity of arable land is left in a wild state to preserve the ecosystems that maintain the balance necessary for a healthy life on the planet, by 2014 as little as 4500 square feet (1372 meters) per person may be functionally available for many low income people for farming in developing countries, where approximately 90 percent of the world's people will live.

Therefore, if conventional US mechanized agricultural approaches – either chemical or organic – were to be used by many low income people, as little as 64% of the food necessary to feed a them might be produced.¹⁶

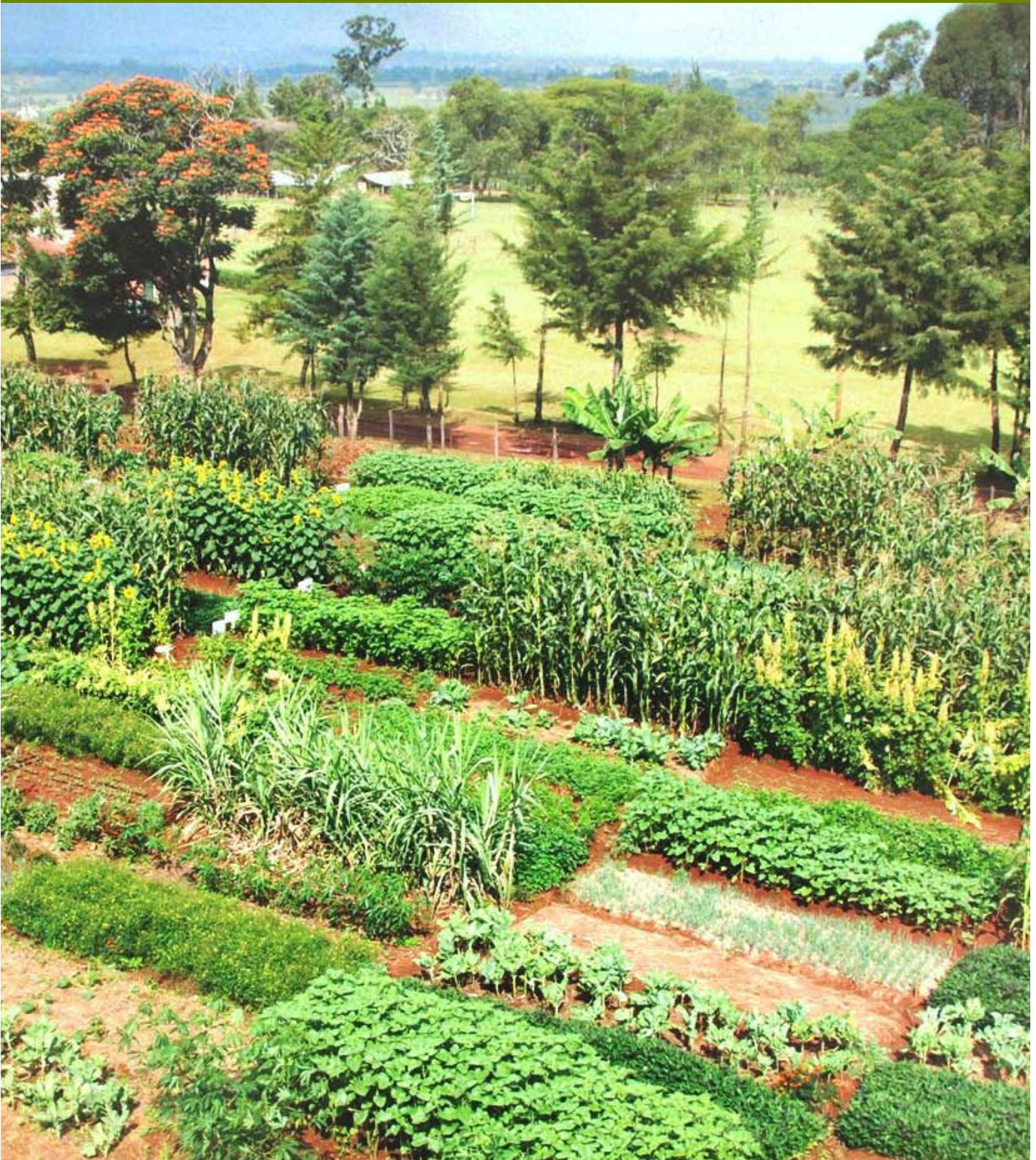




"If global poverty is to be reduced, agricultural development will have to pay particular attention to the problems faced by ...small-scale producers and their families."
—IAASTD: Agriculture at a Crossroads

"We need both productivity and sustainability"

– Bill Gates, World Food Prize Speech



"[World food security depends upon getting] "back to basics" to support rural agriculture... ..smarter farming and production has got to be part of the solution"

–Helen Clark, Chief Administrator of the United Nations Development Programme

BIOINTENSIVE AGRICULTURE PROVIDES A SUSTAINABLE SOLUTION

Biologically intensive agriculture is a prolific and sustainable method for growing food which has its roots in the history of humankind: it was practiced 5000 years ago in Ethiopia, 4000 years ago in China, Japan and Korea, 2000 years ago in Greece, and 1000 years ago in the Mayan culture. In 2009 it was the method featured in the primary case study in the UNEP-UNCTAD report *Organic Agriculture and Food Security in Africa*, with positive results.

Using Biointensive agriculture in its modern, scientifically proven form, at intermediate-level yields, with a reasonable buildup of soil quality and farmer skill, on approximately 4000 square feet (317.6 square meters) per person it is possible to raise:

- A complete vegan diet, *plus*
- All the carbonaceous and nitrogenous compost materials necessary to maintain fertile soil, *and*
- A modest income.

Per pound of food produced, as compared with conventional mechanized agriculture, the Biointensive method has the capacity to use:

- 66% less water,
- 50-100% less purchased nutrients*,
- 94-99% less energy in all forms, while producing
- Substantially increased yields, and
- A 100% increase in soil fertility!

The Biointensive method is organic, sustainable, low-input, high-yield agriculture, and is already being implemented by small farmers in 141 countries around the world. It truly has the potential to combat hunger and establish food security, and to be the “greener revolution” this planet needs.¹⁶

* Purchased fertilizers used are predominantly locally available nutrients in organic fertilizer form.



BIOINTENSIVE AGRICULTURE

A sustainable solution



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