

Creating an EverGreen Agriculture in Africa

For food security and environmental resilience



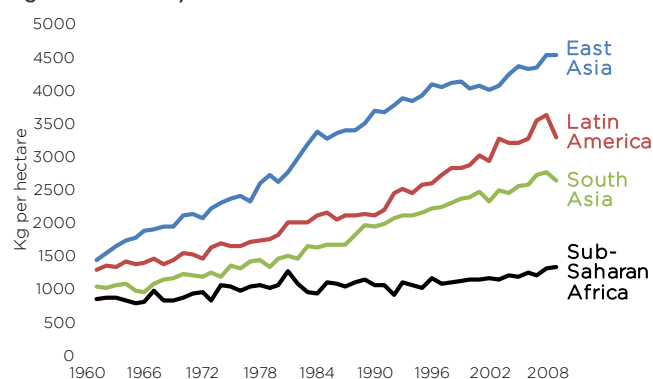
Mature *Faidherbia albida* parkland with millet production, Senegal.

Credit: Gray Tappan

“EverGreen Agriculture allows us to glimpse a future of more environmentally sound farming where much of our annual food crop production occurs under a full canopy of trees.”

- Dr. Dennis Garrity
UNCCD Drylands Ambassador

Figure 1: Cereal yields since 1960



A perfect storm of challenges

African agriculture must be transformed in the coming decades. With a population burgeoning to 1.8 billion people, at least twice as much food must be produced per year by 2050 to avoid widespread starvation.

But food production per capita has been declining since the 1960s, and cereal crop yields have remained stagnant (see Figure 1). In the face of this dire situation, observers are pointing to a perfect storm of further challenges.

Resting or fallowing exhausted cropland for several years has always been the means by which African farmers restored the fertility of their soils. But as rural populations grew, the land frontier closed in most countries. Farm sizes are now rapidly declining. Fallowing can no longer be practiced, and the vast majority of farmers are forced to crop their fields continuously. Farm yard manure supplies are declining in many areas, since livestock numbers cannot be sustained as the area of grazing land declines.

Chemical fertilizers are an important means of restoring soil fertility, but fertilizer prices are escalating, putting fertilizer use further out of reach for most farmers. The risks of devastating droughts are also increasing because of climate change. These conditions prevent more than 3 out of 4 farmers from using chemical fertilizers to increase their crop yields. Surveys are finding that farmers are becoming overwhelmingly concerned about how to reverse their declining soil fertility.

How can productivity be doubled in the presence of such constraints? It is time for fresh, out-of-the-box approaches to be given serious consideration as a basis for advancing African agriculture.

EverGreen Agriculture - a solution

EverGreen Agriculture is now emerging as an affordable and accessible science-based solution to regenerate the land on small-scale farms, and to increase family food production and cash income. EverGreen Agriculture is a form of more intensive farming that integrates trees into crop and livestock production systems at the field, farm, and landscape scales. The vision is sustaining a green cover on the land throughout the year.

EverGreen farming systems feature both perennial and annual species (trees and food crops). The overall indicator of their effectiveness is building a healthy soil and environment, while increasing the resilience of the farm enterprise to a variety of shocks. They may deliver extended growing seasons, increased crop yields, better water utilization efficiency, and drought resilience.

Millions of women and men farmers in Zambia, Malawi, Niger, Burkina Faso, and other countries are already practicing EverGreen Agriculture. They are successfully restoring their exhausted soils with richer sources of organic nutrients, and dramatically increasing their crop yields and incomes.

The integration of appropriate fertilizer trees into agriculture is a promising, but underappreciated, approach. EverGreen Agriculture contributes to integrated soil fertility management. It emphasizes the application of sound, tree-based management practices, and the

EverGreen Agriculture is a form of more intensive farming that integrates trees with annual crops.

knowledge to adapt these to local conditions, in order to optimize fertilizer and organic resource-use efficiency for greater crop productivity. It is also compatible with reduced tillage, increased residue retention on the soil surface, and other principles of conservation agriculture, in situations where these practices are feasible and appropriate.

EverGreen Agriculture broadens the principle of crop rotations to encompass the role of fertilizer trees and other cash crop trees to provide needed biological and income diversity in the farm system. In this respect, the types of intercropped trees may include species whose primary purpose is to provide products or benefits other than soil fertility replenishment alone, such as fodder, fruits, timber, and fuel wood. In such cases, the trees provide a value greater than that of the annual crop that would have been obtained from the land area occupied by the trees.

The Evidence

The principles of EverGreen Agriculture have already been widely applied in Africa, where complexity is a common feature of the agricultural system. Each of the countries where they have been applied feature a diversity of

Forms of EverGreen Agriculture Practices



Farmer-Managed Natural Regeneration (FMNR):

Systematic regeneration of trees from living stumps, roots and seeds. Over 5.5 million hectares in Niger, Senegal, and Mali have been regenerated in this way (*photo*).



Conservation agriculture with trees:

Tree-crop intercropping along with minimum or zero tillage, keeping soil covered with organic material, and rotating and diversifying crops. National programs are underway in Zambia and Malawi (*photo*).



Trees planted in conventionally tilled cropland:

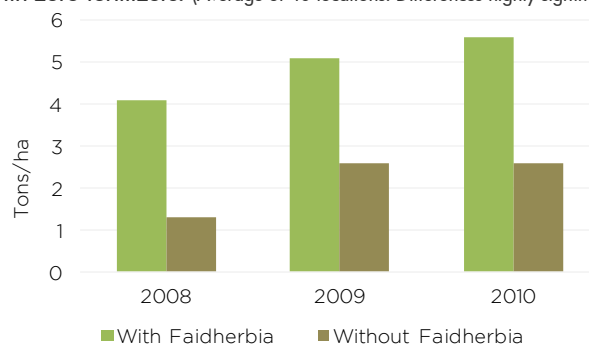
These may be exotic or indigenous fruit, fodder, timber, fuel wood, or fertilizer trees, as for example in Kenya and Rwanda (*photo*).

situations managed by farmers, and they build successfully on proven indigenous farming technologies.

Some of the most promising results are coming from the integration of fertilizer trees into cropping systems. The trees improve soil fertility by drawing nitrogen from the air and transferring it to the soil through their leaf litter and roots. Scientists have been evaluating various species of fertilizer trees for many years, including *Caliandra*, *Sesbania*, *Gliricidia* and *Tephrosia*. Currently, *Faidherbia albida* is showing particular promise as a cornerstone of Evergreen Agriculture. This indigenous African acacia is already a natural component of farming on millions of farms across the continent. Unlike most other trees, *Faidherbia* sheds its nitrogen-rich leaves during the early rainy season, making it highly compatible with food crops because it does not compete with the crops for light, nutrients, or moisture.

In Niger, *Faidherbia*-dominated agroforests have recently spread through farmer-to-farmer diffusion, to over 5 million hectares. In Mali, such parklands have recently spread to over 450,000 hectares. They are increasing food security by enhancing millet, sorghum, and livestock fodder production, with up to 160 trees per hectare. In Zambia, more than 160,000 farmers have extended their conservation farming practices to increase the yield of their maize crops by intercropping with *Faidherbia* trees

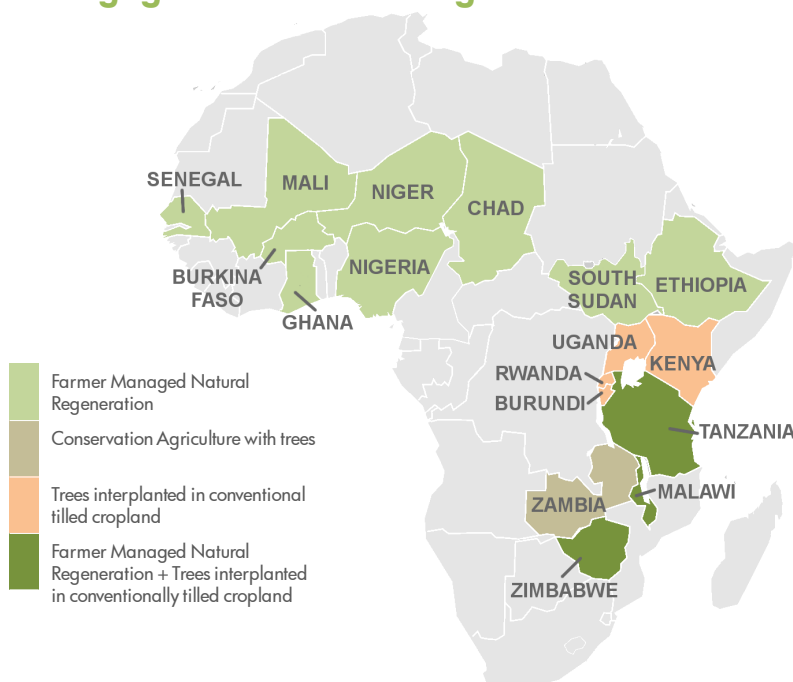
Figure 2: *Faidherbia* trial results in Zambia showing Maize yields with zero fertilizers. (Average of 40 locations. Differences highly significant)



(see Figure 2). Similar results have emerged from Malawi, where maize yields on farms with fertilizer trees are typically 2.5 times higher than without them. The Malawi Agroforestry Food Security Programme is integrating fertilizer, fodder, fruit, fuel wood, and timber tree production with food crops on small farms at a national scale. It has reached 200,000 farm families during its first 5 years. Farmers' maize yields increased from 1.3 to 3.1 tons per hectare.

In each of these cases, there is evidence that the EverGreen practices have increased household and national food security, and are amongst the lowest cost, least risky, and most easily diffused agricultural practices accessible to small scale farmers. National Governments across Africa are now deepening their support for the expansion of these EverGreen Agriculture systems.

17 countries are now engaged in EverGreen Agriculture



Community of EverGreen Nations

The experiences of Zambia, Malawi, Niger, and Burkina Faso indicate that the principles of EverGreen Agriculture are applicable to a broad range of food crop systems in Africa, if accompanied by adequate testing and farmer engagement. The farming practices embodying the principles of EverGreen Agriculture are unique to each country, but they exhibit important similarities.



Young, regenerating agroforest parkland on millet farms, Niger. *Credit: Gray Tappan*

Tanzania and Kenya have recently developed national strategies and work plans to support the expansion of EverGreen Agriculture. National scaling-up programs are being launched in Ethiopia, Rwanda, Senegal, and a number of other countries, building on the successful scaling-up in Malawi, Zambia, and Niger (*see map*).

Seventeen African countries are now either implementing or developing national EverGreen Agriculture scaling-up initiatives, along with India and Sri Lanka in South Asia. The African Union, World Bank, IFAD, GEF, FAO, UNEP, UNCCD and other international and regional organizations have endorsed these efforts and are supporting them. Many NGOs are now engaged in implementing this work on the ground.

An EverGreen Agriculture Network

An EverGreen Agriculture Network is evolving to support the information needs, capacity building, and knowledge generation required to assist the community of EverGreen Nations in scaling-up. A broad alliance is emerging of governments, international donors, research institutions, and international and local development partners to

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expand EverGreen Agriculture throughout Africa and Asia. The momentum that has been generated is encouraging. But an accelerated effort is needed to expand the reach of EverGreen systems to transform the farms of tens of millions of the poorest small-scale farmers.

Today, Africa is critically threatened by food insecurity, land degradation, and climate change. Smallholder farmers need science-based solutions to increase the efficiency of their crop production systems: Solutions that build upon the best of local knowledge and practice, and that are truly accessible and affordable. EverGreen Agriculture provides new options to better care for the land and to increase smallholder food production and cash income. It is, in short, a concept whose time has come.

For more information

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EverGreen Agriculture website:
<http://evergreenagriculture.net>

World Agroforestry Centre website:
www.worldagroforestry.org

“Successful examples of EverGreen Agriculture from Africa urgently need further research and scaling-up to create a real evergreen revolution”

- Prof MS Swaminathan
Founder, MS Swaminathan Research Foundation



Maize farming in a Faidherbia agroforest in Mbarali District, Southern Highlands, Tanzania, 2008. *Credit: ICRAF*