



Maize growing under a canopy of *Faidherbia* trees in southern Tanzania. Photo: World Agroforestry Centre

EVERGREEN AGRICULTURE

“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, Director General, World Agroforestry Centre

The challenge for agriculture

Throughout the world, agriculture is faced with an immense challenge: how to increase yields to feed a growing population from depleted soils and do so in the face of climate change.

Can this be achieved in a way that is sustainable, affordable and does not further threaten biodiversity?

In Africa, at least twice as much food must be produced by 2050 to avoid widespread starvation amongst an expected population of 1.8 billion. But, food production per capita has been declining and cereals yields have remained stagnant since the 1960s.

There is an urgent need to increase biomass production in farming systems with richer sources of organic nutrients to complement whatever amounts of inorganic fertilizers a smallholder farmer can afford to apply, if any.

Hundreds of thousands of farmers in Zambia, Malawi, Niger and Burkina Faso are meeting this challenge through the adoption of Evergreen Agriculture. They are restoring exhausted soils and dramatically increasing both crop yields and incomes with this approach.

Evergreen Agriculture = agroforestry + conservation farming

Evergreen Agriculture is emerging as an affordable and accessible science-based solution to caring better for the land and increasing smallholder food production.

The integration of appropriate fertilizer trees into food crop agriculture is a promising, but underappreciated, approach. Evergreen Agriculture, where trees are intercropped in annual food crop systems, sustains a green cover on the land throughout the year. It bolsters nutrient supply through nitrogen fixation and nutrient cycling, increases direct production of food, fodder, fuel, fibre and income from products produced by the trees, enhances carbon storage

Open Public Forum at the 16th World Congress of Soil Science
How we can create an evergreen agriculture for food security with climate change adaptation and mitigation
Wednesday 4 August
2.55 pm–3.50pm Soils and Forests Session
Great Hall 1&2, Brisbane Convention and Exhibition Centre



both above and below ground and biological diversity. This also enhances resilience to climate variability and climate change.

The evidence

The principles of Evergreen Agriculture have already been widely applied in Africa, where diversity and complexity is a common feature of agricultural systems. The most promising results are coming from the integration of fertilizer trees into cropping systems. These trees improve soil fertility by drawing nitrogen from the air and transferring it to the soil through their roots and leaf litter. Scientists have been evaluating various species of fertilizer trees for many years, including *Sesbania*, *Gliricidia* and *Tephrosia*. Currently, *Faidherbia albida* is showing particular promise as a possible cornerstone of Evergreen Agriculture in the future.

This indigenous African acacia is already a natural component of farming systems across much of the continent. Unlike most other trees, *Faidherbia* sheds its nitrogen-rich leaves during the early rainy season and remains dormant throughout the crop-growing period. The leaves grow again when the dry season begins. This makes it highly compatible with food crops, because it does not compete with them for light, nutrients, or water during the growing season: only its bare branches spread overhead while the food crops grow to maturity (see the photograph on the front of this flyer).

In Zambia, more than 160,000 farmers have extended their conservation farming practices to include the cultivation of food crops within agroforests of *Faidherbia* trees.

Similar results have emerged from Malawi, where maize yields increased up to 280% in the zone under the canopy of *Faidherbia* trees compared with the zone outside the tree canopy. The Malawi Agroforestry Food Security Programme is now integrating fertilizer, fodder,

fruit, fuelwood and timber tree production with food crops on small farms at a national scale.

In Niger, there are now more than 4.8 million hectares of *Faidherbia*-dominated agroforests enhancing millet and sorghum production, with up to 160 trees on each hectare. Encouraged by this, new programs to promote farmer-managed natural regeneration with *Faidherbia* and other species are being established in other countries across the Sahel.

Promising results have also been observed from decades of research conducted in India and Bangladesh.

Next steps and research questions

A broad alliance is emerging of governments, research institutions, and international and local development partners committed to expanding Evergreen Agriculture across Africa. Interest in Evergreen Agriculture is also developing in South Asia and Australia.

More research is urgently needed to:

- Document the potential for these systems to enhance climate change adaptation, and to sequester carbon for climate change mitigation
- Better quantify the nutrient cycling benefits and refine agronomic practices of these systems
- Further improve propagation and establishment methods
- Better characterize and utilize the genetic variation in the tree species for diverse agricultural environments
- Understand the social and cultural context of these systems, as developed and used by farmers
- Clarify the financial, risk, and economic implications of integrating these systems into smallholder agriculture
- Underpin policy reform to support the spread of Evergreen Agriculture.

For more information

World Agroforestry Centre website www.worldagroforestry.org

Visit our Evergreen Agriculture page www.worldagroforestry.org/evergreen_agriculture

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