



World Agroforestry Centre

TRANSFORMING LIVES AND LANDSCAPES

## Addressing Africa's Food Crisis from the Ground Up

World Agroforestry Centre  
May 2008

Global fertilizer prices rose more than 200 percent in 2007. This unprecedented rise in fertilizer prices represents an imminent crisis for resource-poor farmers in sub-Saharan Africa. African farmers desperately need nutrients in all forms to replenish their depleted soils. About 75 percent of the farmland in sub-Saharan Africa is plagued by severe degradation, losing basic soil nutrients needed to grow the crops that feed Africa. Sharply increasing fertilizer prices further limit the choices of African farmers and push them to clear more forests and woodlands for cultivation.

Vast areas of agricultural land in Africa are succumbing to the subtle threat of soil fertility loss, yet currently, African farmers apply, on average, only 10 percent the amount of soil nutrients used in the rest of the world. Reversing the decline is vital if farmers are to have a chance at improving rural livelihoods through more intensive agricultural production.

### Farmers Need Better Options to Improve Fast Declining Soil Fertility

Part of the solution to this problem lies in innovative policies and practices to foster more efficient use of mineral and locally-available organic sources of nutrients. African farmers need to be able to draw from a range of low-cost, pro-poor options. These include the integration of multipurpose grain, tree and forage legumes into African farming systems, and better management of animal manures.

Another promising approach is the use of "fertilizer trees." Research from the World Agroforestry Centre confirms that farmers who plant leguminous trees can easily double their production of basic cereals. The trees siphon large amounts of nitrogen from the atmosphere and transfer it to the soil where it can be used by crops. The trees provide much the same benefit as mineral fertilizers and greatly improve soil quality by stimulating natural biological processes essential to soil health. Fertilizer trees are used throughout Southern Africa where they have been tested by an estimated 400,000 farmers, principally in Zambia and Malawi.

"Fertilizer trees could be an important factor in helping farmers to cope," says Dennis Garrity, Director General of the World Agroforestry Centre based in Nairobi, Kenya. The trees not only improve crop yields, but diminish the impact of drought by shading the soil and helping it to retain moisture.

One big advantage is that the trees basically put the job of producing fertilizer into the hands of farmers, Garrity adds. "Fertilizer trees are like small fertilizer factories that can be placed in the fields where they are needed most."

They are also a one-time investment. Once established – usually a two-year process – seed multiplication and extension activities can be largely left in the hands of local communities and traditional governments.

## **Adapting to Local Circumstances**

Because soil conditions and rainfall patterns vary, World Agroforestry Centre researchers have developed a portfolio of fertilizer tree systems that farmers can choose from depending on local circumstances.

For example, in Zambia, where land is plentiful and population pressure is relatively low, farmers often use *rotational fallow*, a soil restoration system in which a parcel of land is planted with trees such as *Sesbania sesban* or *Tephrosia vogelii* and left fallow or undisturbed for 24 months. At the end of the fallow period, the trees are cut and the leaves and small branches are mixed with the soil for use as fertilizer.

In places where population is high and land is scarce, as in Malawi, farmers use an *intercropping* system in which they plant fertilizer trees shortly after their maize crop is seeded. Although trees do not provide fertilizer until the second season, the system greatly speeds up the time needed to restore soil fertility.

Garrity notes that women and the poor are major beneficiaries of these systems and, in many cases, are among its most enthusiastic supporters.

Economic studies, he says, show that female-headed households, especially those living in extreme poverty, adopt fertilizer trees at the same rate as their wealthier male counterparts. Because fertilizer trees suppress weeds and reduce soil compaction, they have the added benefit of greatly reducing the burden of land preparation, a traditional responsibility of female members of the household.

Women also benefit from the fuel wood produced by the trees. Once fully established, a hectare of fertilizer trees produces an average of 10 tonnes of firewood, three times the amount used by the average African family. By growing fertilizer trees near the homestead, much of the burden of carrying firewood is largely eliminated.

## **Recommendations**

Fertilizer trees are an important part of the solution to Africa's soil fertility problems, but are not the only solution, Garrity adds. "What African farmers need is the opportunity to draw from a range of improved soil fertility options, including fertilizer trees, organic and mineral soil nutrients, and better ways to manage their soil resources."

In addition to the deployment of fertilizer trees, the World Agroforestry Centre offers the following policy recommendations:

- Fertilizer subsidies are an approach to consider. In Malawi, subsidies have been used and farmers are experiencing a bumper harvest for the first time in years. But policy makers should be careful not to create a culture of dependency for farmers that erodes market incentives.
- Efforts by African governments towards improving poor farmers' access to mineral fertilizers should be expanded to include a range of soil fertility management practices, such as manure, compost, conservation farming, and agroforestry.
- CGIAR scientists in Zimbabwe have found that a new technique, known as micro-dosing, is boosting maize yields significantly. The fertilizer micro-dosing approach entails encouraging farmers to use small amounts of fertilizers to increase production. Rather than farmers being

turned off by costly 90 kilogram bags, the program encourages sellers to repackage fertilizers in smaller amounts that are less financially daunting to farmers. Similar programs are now being introduced in South Africa and Malawi. This approach could be brought to scale across Africa with the right support.

- The adoption of new, rapid, low-cost, and reliable soil analysis techniques such as infra-red spectroscopy that governments can use to provide farmers with precise recommendations about how best to improve their soils.
- The introduction of agroforestry carbon sequestration projects that can help tree farmers benefit from the international carbon trade. Carbon projects will stimulate the planting of trees that improve soil quality and will also put money in farmers' pockets.
- Governments should address the urgent need to develop national and local capacity in tree seed production and distribution to meet farmers' needs.
- Place greater emphasis on systems that make use of traditional farmer knowledge. By combining science and traditional farmer knowledge, it should be possible to bring back thousands of hectares of degraded farm land that can no longer be used to produce food. An example is the use of improved *Ngitili* systems, a land management technique that has helped Tanzanian farmers reclaim more than 300,000 hectares in a region once threatened by desertification.

For more information, please visit:

- Fertilizer trees:  
[http://www.worldagroforestry.org/backup/ar2004/tf\\_story01.asp](http://www.worldagroforestry.org/backup/ar2004/tf_story01.asp)
- Infra-red Spectroscopy:  
<http://www.worldagroforestry.org/sensingsoil/index.html>
- Carbon Agroforestry:  
[http://www.worldagroforestry.org/units/library/books/book%2013/rewarding%20the%20upland%20poor/htmlold/carbon\\_sequestration.htm](http://www.worldagroforestry.org/units/library/books/book%2013/rewarding%20the%20upland%20poor/htmlold/carbon_sequestration.htm)
- Landcare:  
[http://www.worldagroforestry.org/units/library/books/book%2093/conservatin%20farming/htmlold/the\\_landcare\\_approach.htm](http://www.worldagroforestry.org/units/library/books/book%2093/conservatin%20farming/htmlold/the_landcare_approach.htm)
- Ngitili:  
<http://www.worldagroforestrycentre.org/news/default.asp?newsid=B0D0F644-86F1-49D2-AB48-231827F9E830>
- Fertilizers: International Fertilizer Development Center (IFDC):  
[www.ifdc.org](http://www.ifdc.org)