



Brazilian technology for agriculture in Africa

The objective is to boost agricultural production by optimizing the use of farm labour and helping reduce widespread land degradation...

A new FAO project in Kenya and the United Republic of Tanzania is forging links between farming communities and Brazilian firms specialized in production of equipment used in conservation agriculture (CA). The objective of that South-South cooperation is to boost agricultural production in both countries by encouraging a shift to CA techniques, which optimize the use of farm labour and could also help reduce widespread land degradation.

Under the three-year, Germany-funded project, up to 4,000 farmers are to be trained through participatory field schools in conservation agriculture practices, including reduced or no-tillage (NT) and the use of permanent soil cover. Since dedicated CA implements - such as knife-rollers and direct seeders - are not widely available, the project will take Kenyans and Tanzanians to Brazil to study CA technologies and will design strategies for developing a sustainable equipment supply chain in the subregion. Lessons learned will be "up-scaled" and disseminated throughout Africa.

Development pathway. FAO says conservation agriculture offers Kenyan and Tanzanian farmers a pathway to sustainable agriculture and rural development, which hinges on sustainable land management and better use of available farm labour.

In Tanzania, where the economy is based mainly on small-scale farming and livestock, an estimated 44 percent of the rural population lives below the poverty line. In neighbouring Kenya, the incidence of rural poverty is around 50 percent, despite strong recent growth in the farm sector. In both countries, land degradation is a major constraint on the productivity of labour and other external inputs. In addition, farming communities have been seriously weakened by migration to urban areas, the rapid spread of the HIV/AIDS, and the persistence of debilitating diseases such as malaria. The reduction in farm labour availability is forcing farmers to abandon traditional methods of land



preparation and other farm operations, and many now plant seed directly into unprepared land immediately after the onset of wet season rains. "While farmers and extensionists often regard such practices as a poor way of farming, planting without ploughing uses less human labour and animal power," says Josef Kienzle, of FAO's Agricultural and Food Engineering Technologies Service. "So, far from being a 'coping mechanism', no-tillage cultivation has the potential - if carried out in conjunction with other appropriate agronomic practices - to become an important part of strategies to improve food production and stabilize threatened rural livelihoods."

The benefits of no-tillage on small farms are well known in Brazil, which has pioneered conservation agriculture in tropical and subtropical farming systems. The first prototype NT seeder and a prototype knife-roller for residue management were designed in 1985 by Agronomic Institute of Paraná State (IAPAR). Research over the following years bore fruit in 1992, when the Paraná government launched a large-scale evaluation of CA systems and ordered 50 seeders and other equipment from a local manufacturer.

With that political backing, and the support of government and private extension services, other

small industries began producing CA equipment and developing new designs tailored to different types of soil, crops and animals. Direct seeding was soon recognized as an excellent means of natural resource conservation, which attracted financial support from the federal government for a programme that encouraged farmers to adopt the innovations.

Economic advantages. Evaluations have confirmed the economic advantages of no-tillage over conventional tillage systems. Trials conducted between 1997 and 1999 showed that the maize yields of no-tillage farmers were 3.5% higher and overall income 11.3% higher. "The most striking differences were observed for returns to labour," says IAPAR's Fátima dos Santos Ribeiro. "Since it requires less labour and distributes labour inputs more evenly across the year, no-tillage systems have a clear advantage."

One study in Brazil's Central-Southern region found that bean production required around 140 hours of labour per hectare using no-tillage methods, compared to 190 h/ha under conventional tillage. In fact, surveys show that, for farmers, the reduction in labour requirements is the most important benefit of no-tillage, ahead of erosion control and even yield increases.

To transfer and adapt that experience to East Africa, the new FAO project will build on the achievements of a pilot CA programme in Kenya and Tanzania, implemented between 2004 and 2006, that created 90 Farmer Field Schools to train farmers and extensionists in CA and sustainable land management. As part of that programme, FAO helped procure a limited quantity of CA equipment from southern Brazil manufacturers.

"In this new phase," says Josef Kienzle, "we will be facilitating the creation of a further 200 field schools, and Brazil has now become a full development partner. An important aim is to help East African equipment manufacturers learn more about Brazilian experience in building a self-sustaining input supply chain for CA equipment, and to promote direct private sector and dealer relationships between Brazil and East Africa."

After an initial study visit by Kenyan and Tanzanian farmers, equipment manufacturers and suppliers to Brazil, Brazilian manufacturers will tour East Africa to gain first-hand knowledge of the small farm sector and the equipment

In Brazil, conservation agriculture implements are used in three basic farm operations:



► **Crop residue management**, which aims at making the soil surface suitable for new crops by protecting it with biomass from the previous crop. Hoes, slashers, knife-rollers (*above*) and modified disk harrows are used to chop the biomass which, as it decomposes, reduces weeds and the need for herbicides.



► **Seeding.** No-tillage seeders cut into the biomass covering, open a groove in the soil, inject seed and fertilizer, then cover and pack them with earth. Various models are available: hand-held "jab" planters, seeders drawn by oxen or horses, and multiple-row seeders (*above*) with a seat for the operator.



► **Weed management.** Although knapsack and animal-drawn sprayers are sometimes used for controlling weeds, a simpler - and safer - alternative for small farmers are "weed wipers" (*above*).

supply chain, with an eye to developing collaborative ventures. The project will explore different approaches to no-till equipment supply in Africa, ranging from direct importation, local assembly and local manufacturing with imported components, to full local production and joint ventures.