Opportunities and constraints for Conservation Agriculture in Africa

John Ashburner, Theodor Friedrich and José Benites

Farmers in Uganda evaluating an animal drawn direct seeder. Photo: Alexandra Bot

It is only recently that government services and development organisations in Africa have become interested in Conservation Agriculture (CA), having learnt of its successful application in Latin America. International organisations including the World Bank, FAO, GTZ, RELMA and Sasakawa 2000, started supporting initiatives to introduce CA in Africa in the late 1990s. Early experiences have been positive although CA has yet to be applied in a manner that encompasses all its aspects. But it is very clear that for CA to eventually be adopted in regions of Africa, it needs to provide sustainable solutions to the many urgent problems that African farmers are currently facing. These include soil degradation, loss of soil fertility, frequent droughts, labour shortages, declining yields and the general drudgery associated with human-powered agricultural production systems. This article discusses some of the opportunities and constraints involved with CA.

Africa's tentative experiences with CA

Many traditional farming systems in Africa have characteristics closely resembling CA systems. Tillage is often limited to planting in holes, mulching is practised (using weeds, crop residues, grasses or green manure), as is direct planting with a hand hoe and a wide diversity of crops and trees are grown. In many commercial agricultural exploitations, conservation (or reduced) tillage and direct planting, combined with the application of herbicides has been widely practised in Eastern and Southern Africa for some time (*Biamah et al 2000*). In Zimbabwe for example, about 75% of the commercial farmers practice some form of conservation tillage (but this may now be in the process of changing). One of the first "No Till Clubs" was formed by a group of commercial farmers in KwaZulu-Natal in South Africa back in the 1970s (*Fowler, 2002*). Cover crops have been the subject of research for many years, as have more suitable crop rotations and ways to better integrate crop and livestock production. However, the impact and the practice of these techniques by smallholder farmers in Africa are still very limited.

Labour saving practices needed

Increasingly, labour shortages are seriously affecting the availability of farm labour in Africa. In many countries, the rural population is steadily being reduced through migration to urban centres. This particularly concerns the younger male population, meaning that those with the best potential for heavy physical work are no longer working on the land. The situation is being further aggravated by the HIV/AIDS pandemic that is so tragically striking many parts of the African continent. As a result, many African households are now headed by women who are experiencing tremendous pressure as they have to not only care for the household and family, but run all the farm operations at the same time.

For these and other reasons, it is now becoming even more essential that farming methods that conserve resources, reduce human labour requirements and significantly improve food security be adopted. CA scores high on all these points, as is described in the previous pages.

Issues influencing adoption

Although there is much potential for the adoption of CA systems in Africa, there are also many issues that affect the feasibility of its introduction and how its principles can be translated into location-specific, agricultural production systems. Some of these are summarised below.

Awareness of the problem by a critical mass of stakeholders is a major precondition for change, particularly if the solution requires dramatic changes in behaviour or practices. The perceived problem must be serious enough to provide the pressure and incentive for change. This is not always the case and many extension services that are accustomed to promoting good ploughing practices are not yet ready to reverse their philosophy and deliver a message favouring direct planting.

A general lack of knowledge is a major constraint, particularly concerning how best to introduce CA techniques and the need for appropriate equipment and inputs such as cover crop seeds and herbicides. Fortunately, there is already a wealth of knowledge available in some parts of Africa, notably in Zimbabwe, Tanzania and Zambia as well as in various parts of Latin America. In addition, there is much that can be learnt from traditional African agricultural production systems, including water harvesting technologies, direct planting, indigenous crops etc. When one considers the present situation in Africa and the rapid advances of CA in Latin America, one cannot but note the excellent opportunity for the development of South-South exchanges.

Lack of a local infrastructure to support the manufacture and repair of CA equipment. A limited range of CA equipment is being produced in Zambia, Zimbabwe and recently in South Africa, with limited distribution. Hardly any CA equipment is available in other African countries and importation from Latin

Knife roller drawn by oxen is a popular tool on small to medium farms in southern Brazil. Photo: Alexandra Bot

America is not an option, due to the low purchasing power of smallholder farmers. Preparing the way for more widespread adoption of CA in Africa will consequently involve strengthening the private sector and provision of appropriate credit facilities.

Land tenure is a critical issue influencing the adoption of CA, as stakeholder commitment to land management is likely to be serious only if there is clarity concerning land titles and property rights. The need for a permanent soil cover can compete with traditional arrangements such as communal grazing of farmer's fields after harvest. Where communal grazing is practised, few crop residues remain and farmers are generally unwilling to invest in growing green manure or cover crops. Solutions to this typical African problem have to be found, preferably by analysing the issues with all the stakeholders concerned.

A permanent soil cover is an essential aspect of a sustainable CA system but the availability of sufficient biomass, both in quantity and throughout the year, can create a serious problem in Africa. The reasons are many. In humid conditions, the decomposition rate of the biomass is very fast. In contrast, a lack of rainfall may constitute a constraint for biomass production. And the available crop residues are needed for animal feed, fencing, fuel and a myriad of other uses. For CA to be successfully adopted in such a context, crop rotations and cover crops must allow production of enough residues to meet all these needs. To help achieve this objective, shrubs or trees can be included in the production system, inter-cropped or planted as living fences.

The integration of livestock into CA systems is very important in Africa, particularly when livestock constitutes a major component of the local economy. Uncontrolled grazing should in any case be avoided if animal nutrition is to be improved. The annual seasonal feed demands of the livestock must be integrated into the design and planning of CA rotations so as to ensure adequate supplies. Specific measures that can be adopted include controlled grazing, zero grazing, improved pastures, forage conservation, improvement of the cut-and-carry system, etc. (*Mueller et al., 2001*).

Organisation of stakeholders so as to improve public commitment is another important factor for the introduction of CA in Africa. Use should be made of existing groups such as Farmer Field Schools (FFS) and exchanges between farmers can usefully be promoted through publicity campaigns, inter-community exchanges and study tours.

Awareness creation

In recent years, a number of international workshops have been convened and pilot projects to create awareness of CA techniques are now being implemented in several countries. The most recent workshop was held at Jinja, Uganda, in May 2002, where amongst others, a range of CA equipment suitable for manual use, with draft animals and with tractors was exhibited (photo p.13).

Work is also commencing in Swaziland and 24 indigenous legume species have been identified already in the Lubombo mountain region and are being studied for their potential for use as cover crops. The first animal drawn knife roller to be constructed in the country was demonstrated in July 2002 and it is planned to demonstrate CA production systems on pilot plots over the coming months. Other CA equipment has also been fabricated in Ghana and Uganda. Awareness creation in CA is also being undertaken in Eritrea and Uganda, whilst additional projects are likely to commence within a few months in Kenya, South Africa, Mozambique and Tanzania. Requests for assistance have also been received from Lesotho, Ghana and Guinea Conakry.

The African Conservation Tillage Network (ACT) was founded in 1998 with the objective of promoting CA and exchanging experiences amongst African practitioners. For this purpose, a web site has been established through FAO (www.fao.org/act-network, see p.30). The Animal Traction Network for Eastern and Southern Africa (ATNESA) is also playing an important role in the development of animal drawn equipment for CA in Africa (www.atnesa.org).

CA - opportunities in Africa

There seems to be an interesting potential for the site-specific application of CA principles in different locations of Africa, both in the humid tropics and also in the more arid areas. A major opportunity arises from the time saving and reduced drudgery of field activities, given the "feminisation of agriculture" and the HIV/AIDS problem. Another opportunity arises from what is considered to be its better mitigation of drought and adverse climatic situations. CA can provide an entry point for arresting the loss of soil fertility through its characteristic of integrated soil fertility management. In this way, it can also contribute to improved yields and enhanced food security.

But the wide-scale adoption of CA in Africa is still in its infancy and its long-term adoption will depend heavily on the human factor and a general willingness for major stakeholders to change. It should not be considered as the only solution, but the authors are of the opinion that, over time, it can make a significant contribution towards improved food security in the continent. ■

- **John Ashburner**, FAO Regional Office for Africa, PO Box 1628, Accra, Ghana. John.Ashburner@fao.org
- **Theodor Friedrich** , AGST, FAO, Rome, Italy.Theodor.Friedrich@fao.org
- **José Benites**, AGLL, FAO, Rome, Italy. Jose.Benites@fao.org

The views expressed in these papers on CA are the personal opinions of the authors and do not necessarily reflect the official policy of FAO.