



The Status of Conservation Agriculture in Southern Africa: Challenges and Opportunities for Expansion

REOSA Technical Brief

03

Food and Agriculture Organization of the United Nations (FAO)
Regional Emergency Office for Southern Africa (REOSA)

July 2010

This technical brief provides information on the status of conservation agriculture in southern Africa and discusses challenges and opportunities for expansion of this farming technology in the region.



Achieving food security remains central to many national and regional programmes and policies in southern Africa. Although agricultural productivity has increased in some countries in the region, many countries remain net importers of food and are thus exposed to environmental and economic factors prevailing in food exporting countries. Average maize yields for the region have not changed much over the past 50 years. Poor farming methods, high levels of soil degradation and consequent desertification are some of the causes of low productivity. Droughts and/or prolonged dry spells often worsen the situation by resulting in severe crop damage or complete crop failures. With the majority of the population in southern Africa dependant on agriculture for their livelihoods, technological options that increase agricultural productivity and help to buffer farmers against the negative impacts of climate related and other constraints should be promoted. One such option is Conservation Agriculture (CA). Conservation Agriculture is a way of managing agro-ecosystems to achieve higher, sustained productivity, increased profits and food security while enhancing the environment. This is achieved through improved management and application of three key principles, in conjunction with other good agronomic practices:

- Minimum soil disturbance
- Permanent soil cover
- Diversified crop associations and rotations

By increasing and stabilizing yields, CA can help alleviate household food insecurity and poverty. Despite the proven benefits from CA, the technology is still practised on a very small area in the region due to limited support.





Africa's level of CA practice

Compared to other regions, Africa is still lagging behind in the extent of CA practice. The estimated areas (ha) under CA for some African countries are:

South Africa	368,000
Zambia	40,000
Ghana	30,000
Kenya	15,000
Sudan	10,000
Mozambique	9,000
Zimbabwe	7,500
Tanzania	6,000
Morocco	4,000

Source: Derpsch et al., 2010

While support on CA is still low, countries in the region are at various stages of incorporating CA into their national development programmes and relevant policies. To help promote and coordinate CA, twelve countries in the region have identified a CA Focal Point (Angola, Botswana, Lesotho, Madagascar, Malawi, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe) and the majority of these countries have



gone on to establish National Conservation Agriculture Task Forces (NCATFs) to spearhead the CA agenda. The NCATFs comprise a wide range of stakeholders including government departments, faith-based organizations, academic and research institutions, NGOs and other development partners. Coordination activities at the regional level are being undertaken by the Conservation Agriculture Working Group (CARWG). It is critical that countries and regional economic institutions institutionalize CA, as this will facilitate greater resource allocation and other support to CA.

GLOBAL CA ADOPTION

By 2009, it was estimated that CA in the form of no-tillage had been adopted on more than 115 million hectares worldwide. No-tillage is defined as a system of planting (seeding) crops into untilled soil by opening a narrow slot, trench or band only of sufficient width and depth to obtain proper seed coverage. No other soil tillage is done (Phillips and Young, 1973).

It is worth noting that more than 85% of the world total area under CA is in North and South America and a mere 0.3% (368,000 ha) is in Africa (see table).

It took Brazil 20 years to adopt the first million hectares under no-till (see figure). The adoption rate has grown to 25.5 million hectares today. Worldwide, it is estimated that no-tillage technology has expanded at an average rate of 6 million ha per year in the last 10 years.

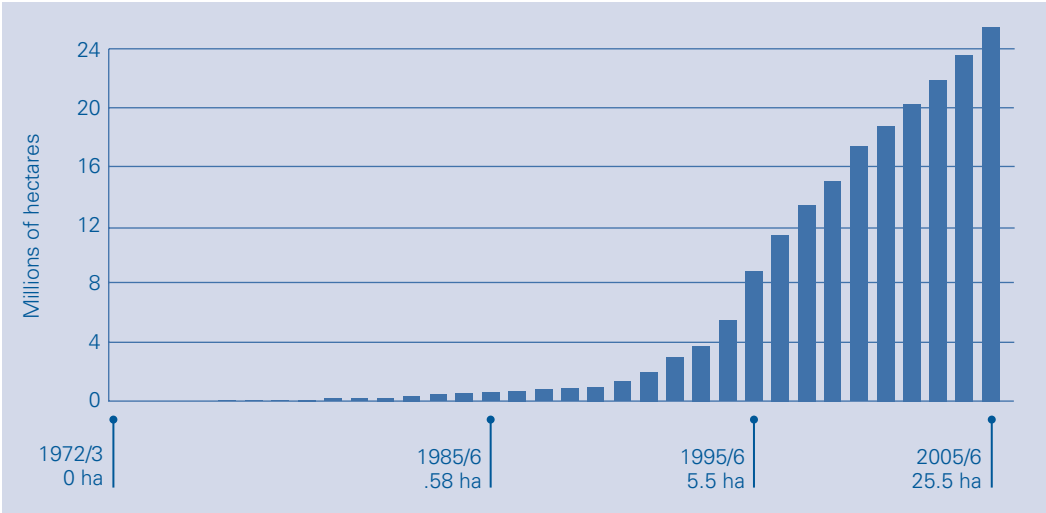
Area under no-tillage by continent

Continent	Area ('000 ha)	%
South America	49,579	46.8
North America	40,074	37.8
Australia & N. Zealand	17,162	11.5
Asia	2,530	2.3
Europe	1,150	1.1
Africa	368	0.3
World total	115,863	100

Source: Derpsch et al. 2010

By adopting the no-tillage system Brazil increased its grain production by 67.2 million tons in 15 years, which, assuming conservative average prices of US\$ 150/t, means additional revenue of about 10 billion dollars (Derpsch, 2003).

Adoption of no-till planting in Brazil between 1972 and 2006



Adapted from: <http://www.febrapdp.org.br/>

The Status of CA in Southern Africa

The promotion of Conservation Agriculture practice in southern Africa began during the 1970s with the main focus being on minimum tillage. Since then, various stakeholders, including faith-based organizations, governments, NGOs, the private sector and research organizations have been promoting CA for smallholder and large scale farmers.

Due to limited data it is currently difficult to give a reliable assessment of the extent of CA adoption in southern Africa. However, it is estimated that on average, less than one per cent of the cultivated land is under CA. Likewise, the policy environment differs greatly from one country to another. The table shows levels of CA practice using basin planting, ripping and no-till (direct seeding) planting (Derpsch et. al. 2010). Most of the smallholder CA farmers in southern Africa currently use planting basins e.g. in Zambia, Zimbabwe and Lesotho. In South Africa, most of the CA, no-till, is currently practised on large scale commercial farms. The minimum tillage methods have been used with varying levels of crop associations and soil cover.

CA practices employed

Country	Basins	Ripping	Direct seeding
Malawi	•		•
Lesotho	•		•
S. Africa			•
Madagascar			•
Zimbabwe	•	•	•
Angola			•
Zambia	•	•	•
Mozambique	•	•	•

Adapted from: *Analysis of the Status and Potential of Conservation Agriculture in Southern Africa*: FAO-REOSA Network Paper (forthcoming)



A comparison between conventional farming and farming with planting basins showed consistently increased average cereal yields by fifty to 200 per cent in more than 40,000 farm households in Zimbabwe between 2004 and 2008 (Twomlow et al., 2008).



Challenges of CA Practice and Possible Solutions

Mind-set: For many people (farmers, extension and policy makers) crop growing is synonymous with ploughing, as good agronomic practice has meant, in the past, keeping fields “clean”. That the clean seedbeds are part of the cause of soil degradation and yield reduction has not been a restraint, as there have hitherto been few viable alternatives. There is also a perception that preparing fields in the off-season is odd (see ‘weed control’ below). A change in mind-set is therefore required. It is important that stakeholders are sensitized and educated on CA through discussions, electronic and print media as well as setting up CA demonstration plots at strategic sites.

Inadequate CA knowledge and skills: Most of the extension agents and farmers lack adequate skills and knowledge on CA. Training at various levels is therefore required.

Retaining residues: Retention of crop residues in the field is a serious challenge for many farmers who operate in communal grazing systems. There are also competing uses for crop residues such as fodder, fencing, handcrafts, roofing and fuel. Traditions of uncontrolled grazing of livestock on stubble and the lack of appropriate winter tolerant cover crops for the drier areas are key issues, as are bush fires (accidental or deliberate). Education and amending of local by-laws to protect CA farmers are important components of approaches to address this constraint.

Weed control: Elimination of ploughing, which plays a role in controlling weeds, initially increases weed infestation. In CA, winter weeding and prevention of weeds from seeding helps to reduce the seed bank reservoir in

the soil and thus subsequently reduces weed pressure in CA. Farmers often do not appreciate the importance of winter weeding, and may also be reluctant to carry it out because of labour constraints. The workload associated with weeding can be reduced in several ways, e.g. the use of herbicides and forming work parties. In the long term, the suppressing effect of mulches and cover crops or crop associations will help to reduce the need for weeding.

Availability of equipment and inputs: The more sophisticated forms of CA require specialized planting equipment and other inputs such as herbicides. Affordability and accessibility of these inputs to farmers can greatly hinder adoption. Some CA equipment is being manufactured in Africa (e.g. in Tanzania, Kenya, South Africa, Zambia and Zimbabwe), but it is insufficient to meet projected demand. There is also a lack of draft power for small-scale farmers, and a limited supply of suitable cover and rotation crop seed. An effort to ensure farmer access to suitable and affordable equipment must be made. This could include encouraging the development of local manufacture and supply of equipment and inputs or cattle restocking programmes to avail draft power to vulnerable households.

Land tenure systems: Farmers may be reluctant to invest in improvement of the status of the soils they cultivate if they do not have clear rights to the land. One way of incentivizing households to increase investments on the land that they occupy is for governments to review land ownership laws and make them more favourable.

A NEED FOR POLICY DEVELOPMENT

Decision-makers can advocate for the necessary CA enabling environment through lobbying for policy changes in parliament, cabinet meetings and other forums within their own governments. Policy makers should ensure that CA is adequately supported by overall agricultural policies as well as other relevant policies such as education, environment and trade. CA needs to be institutionalized in schools, tertiary colleges and universities. Policy development could also ensure there is adequate funding allocated to research and extension of CA by national bodies. Policy incentives could include, for example, subsidies on CA equipment and chemicals e.g. herbicides. Farmers using CA could also get special concessions e.g. tax exemptions on certain purchases, special prices for their commodities etc.

Other areas where there is a necessity to improve the policy environment to stimulate CA uptake include:

- Village land use planning
- Arable farming expansion versus maintenance of rangeland
- Environmental policies



MAJOR BUSINESS OPPORTUNITIES

There is a pressing need for locally adapted and manufactured equipment. This represents a major business opportunity.

- The jab planter technology has been generally accepted by smallholder farmers who can appreciate the benefits of direct planting and fertilizing in one pass. As a response to the demand for the implement there has already been some small-scale batch production of jab planters in several countries, which needs to be nurtured.
- Draft animal powered equipment (ripper, planter, knife roller and sprayer) has been greeted enthusiastically, but there is always the problem of the cost of obtaining the technology. Knife rollers are being manufactured in Uganda and Tanzania, and no-till planters in Tanzania but, to date, these technologies have not been widely adopted.
- Tractor powered CA technology is currently only suitable for larger scale, commercial farmers, due principally to the high level of investment required. Opportunities are emerging to switch utilisation of the clusters of two wheeled tractors (power tillers) to CA and acquiring no till seeders for existing tractors.

CA in Southern Africa: Challenges and Opportunities for Expansion

Efforts to adapt the CA principles and technological aspects to suit various agro-ecological, socio-economic and farming systems in the region started a few decades ago. Greater support from stakeholders including policy and decision makers at the local, national and regional levels will facilitate expansion of CA and help farmers to reap more benefits from the technology. Some of the ways in which CA expansion can be enhanced in the region are described below.

Sensitize and educate the public

There is an urgent need to increase awareness of the social, economic and environmental benefits of CA among the general population. Appropriate CA promotional and awareness materials and approaches should be used to sensitize and advocate for CA among communities, national governments, regional intergovernmental institutions, private sector, development actors, researchers and other stakeholders.

Conservation Agriculture should also be discussed in relevant local level and national level meetings such as parliamentary committee meetings, sectoral and inter-sectoral meetings and round table dialogues. Ministerial and Heads of State Summits such as those for Agriculture, Environment, Industry and Trade can also be used as CA sensitization and advocacy platforms. CA demonstration sites established in strategic sites can also facilitate CA expansion and uptake by providing visual evidence on CA performance to communities in their local situations.

Support training on CA

Training on CA should be supported at all levels. Efforts to adequately train all new and existing agricultural extension personnel on CA should be made in relevant departments. Consideration to extension approaches such as the Lead Farmer Approach should also be made as a way to mitigate extension shortages at the local level. In the long term, CA should be included in curricula from primary school to university levels, including agricultural colleges.

Institutionalize CA

CA has to be mainstreamed in relevant ministries, departments or institutions and supported by adequate provision of material, human and financial resources to ensure that farmers receive effective and timely support from well trained and motivated extension staff. Key local, national and regional (e.g. SADC, AU-NEPAD) institutions should have dedicated CA champions among their staff who will help to ensure that relevant plans, programmes and policies embrace CA.

In the short to medium term, policy makers could support activities of national and regional CA working groups to ensure that relevant thematic (research, technical, extension, training, education, inputs and output markets, policy) areas are covered by various CA programmes.

Institutionalizing CA into relevant government ministries and departments and regional institutions is required for sustainability of the technology. Local, national and regional policy and decision makers could



spearhead and support the formulation and development of strategies and mechanisms for scaling up the technology. CA could be integrated into interventions such as seed, fertilizer and tillage and draft power support programmes as a way of further enhancing productivity.

Support the adaptation and validation of CA technologies in local environments

Adaptive research is required to tailor CA principles and practices to local conditions. This should be done in collaboration with local communities and other stakeholders. Issues that should be addressed include crop species, selection and management of crop and cover crop associations and rotations, maintenance of soil cover, production of fodder and CA equipment.

Support the development of CA equipment and ensure its availability

While some countries produce CA equipment, most of the available implements and equipment are imported. In the short term, consideration could be made on removing or reducing tariffs on imported CA equipment and implements to encourage and promote their availability.

In the medium to long run, local manufacture of these will increase availability, ensure that equipment is adapted to local conditions, increase employment opportunities and reduce costs. The larger and more complex equipment is expensive and users may have to hire it. There is an opportunity to develop a local hire service industry by providing

equipment, and training on machine maintenance and business skills. Where governments support land preparation schemes using ploughs, there is scope to change the equipment to rippers or direct seeders to reduce the cost and align the schemes to CA approaches.

Facilitate development and strengthening of input-output markets

CA expansion can further be enhanced when stakeholders support opportunities and mechanisms for direct sale or processing of surplus produce.

In some countries prevailing market prices for the staple crop are low and discourage farmers from increasing surplus production. Food aid and distribution by governments and NGOs may also undermine the local produce market.

The private sector should be encouraged to establish and run supply chains incorporating input suppliers, rural workshops, machinery supply and hire services.

Promote Payments for Environmental Services (PES)

Market based opportunities such as carbon trading, eco-tourism, bio-energy, agro-fuels, green/organic labels and certification could fund CA. PES is a concept whereby it is recognized that users of the land have a great impact on the quality of life for all. Adopters of CA improve the environment through carbon sequestration, prevention of soil erosion or the encouragement of groundwater recharge. Farmers could be rewarded for such services.

REFERENCES

- Derpsch, R, T Friedrich, A Kassam and L Hongwen, 2010.** Current Status of Adoption of No-till Farming in the World and Some of Its Main Benefits. *Int J Agric & Biol Eng*; 3(1): 1-25.
- FAO, 2010.** Analysis of the Status and Potential of Conservation Agriculture in Southern Africa. FAO-REOSA Network Paper, forthcoming.
- Phillips, S H and Young H M, 1973.** *No-tillage Farming*. Reiman Associates, INC, Milwaukee, Wisconsin, USA.
- Twomlow, S, J C Urovov, M Jenrich and B Oldrieve, 2008.** Lessons From the Field – Zimbabwe's Conservation Agriculture Task Force. *Journal of SAT Agricultural Research* 6.

Photographs © FAO and the African Conservation Tillage Network



USAID
FROM THE AMERICAN PEOPLE



NORWEGIAN MINISTRY
OF FOREIGN AFFAIRS