Conservation Agriculture in developing countries

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Conservation Agriculture in developing countries

1) Situation of agriculture in sub-Saharan Africa
2) Conservation agric. (CA) as a potential solution
3) Inevitable constraints
4) Regional disparities: *Can Africa learn from Brazil?*
5) ACT and the CA related Projects in Africa
6) Challenges and Conclusions

Situation of agriculture in SSA

- Mainly subsistence agriculture
- Practised by smallholder farmers
- Low asset-base level:
  - < 2ha
  - 65% of area hand cultivated
  - Low investment capacity
- Farming is drudgery, especially for women.

⇒ Today, 30% of the population is still chronically hungry

Shortfall of farm power in SSA

Power source	Constraints to availability
Human power	- Better education - Youth migration - Pandemics (hiv/aids, malaria,…)
Draught animal power	- Cattle diseases - Droughts, lack of fodder - Distress sales and theft
Tractors	- Public hire services closed - Private tractor services are rare - High cost of maintenance and repair

Consequences of *acute* farm power shortage:

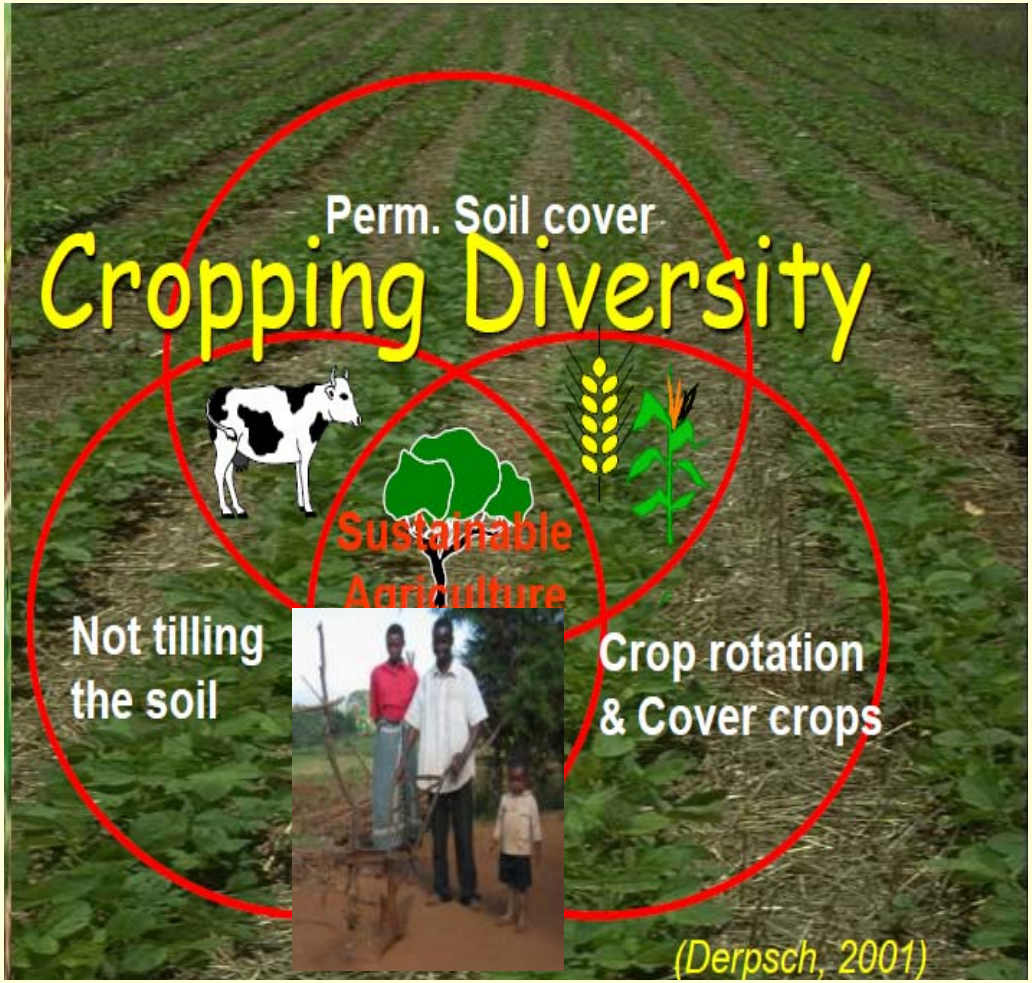
- Strategy is subsistence for short term needs
- Reduced cultivated area
- Less labour intensive crops
- Delayed and incomplete farm operations
- Vulnerable to climatic shocks (→ adaptation strategies)

I. Make existing tasks easier and increase farm power productivity (invest in farm power)
II. Change farming practices to methods that use less farm power (towards CA)
III. Use **a twin-track approach**?

What is Conservation agriculture?

- CA is a concept – it is not a single praxis
- CA aims to achieve sustainable and profitable agriculture and subsequently aims at improved livelihoods of farmers through the application of the three CA principles: (1)minimal soil disturbance, (2) permanent soil cover and (3) crop rotations.
- CA holds potential for all sizes of farms and agro-ecological systems, but its adoption is perhaps most urgently required by smallholder farmers – in Africa

What is Conservation agriculture?



Conservation agriculture

Soil Organic Matter = Drought Resistance

Conventional Agriculture

Zero Tillage

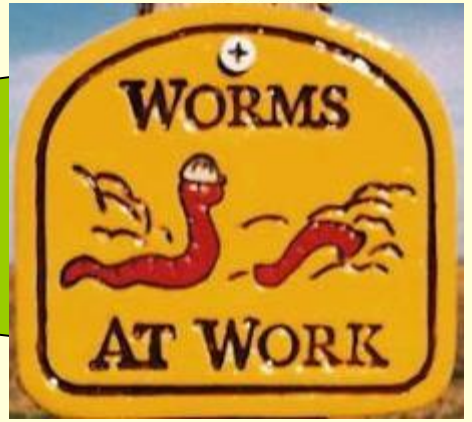
Action of Soil Biota

Structure/Porosity

High Soil Organic Matter

low soil organic matter

Biological Tillage



Mechanical Tillage

CA - a potential solution

Direct planting means:

- Less labour: no-tillage, no-digging.
- Fewer workers: 1 person for planting instead of 3
- and less energy : fewer draught animals or smaller tractors

⇨ Up to 60% labour saving for hand-hoe cultivators.

CA has also positive effects on weed-control (after few years) :

- Permanent soil cover
- Crop rotations
- Use of herbicide at planting time

⇨ From 3 hand-weedings to only 1.

Labour inputs in hoe systems

Activity	Systems (hours/ha)		Labour saved by CA over conventional	
	Conventional	**CA**	**Hours saved/ha**	**In Percent**
Land clearance	Slash and carry off the field **115**	Slash and 1 herbicide at plant. time **52**	**63**	**55%**
Land preparation and planting	hand hoe and hand planting **120**	Jab planter **47**	**118**	**70%**
Weeding	Hoe, panga, roguing; **172**	Hoe, panga, roguing; **54**	**118**	**70%**
Total	**407**	**153**	**254**	**60%**

Bishop-Sambrook et. al, 2004

CA can reduce the burden of women's labour

Jab-planter is perceived as a sign of progress and welcomed by women

Tools for manual labour inputs

Knowledge intensive – training needs

Animal traction equipment: expensive; mulch planters are rare

The CA/basin system

The CA/basins in Zambia & Zimbabwe

- Precision farming for smallholders – high concentration of inputs, moisture capture, timeliness of planting.
- Results in higher and better yields then conventional. 4 - 8 tonnes / ha maize.
- But initial labour input is high in this special system

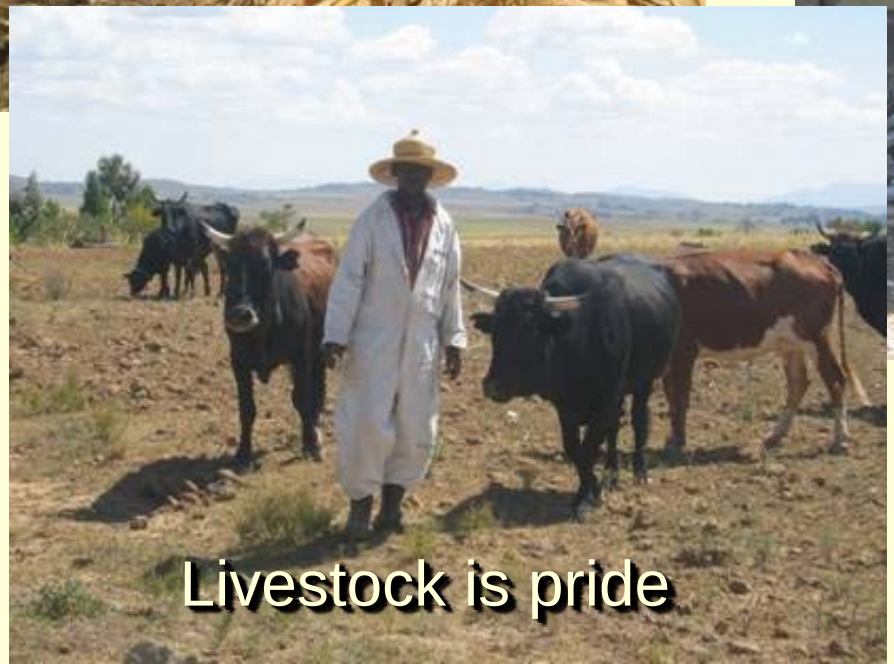
Caution: Labour savings may not be immediate

- Cover crop management requires additional labour
- A few years of good CA practice needed to get the full benefits of the system
- Weeding without herbicide remains arduous and time-consuming

Inevitable constraints

	CA adoption constraints
Technical	- Maintaining soil cover (it is an assest for smallholders, competition with livestock) - Weed control (use of herbicides)

Residues



Crop residues are a (*short term*) livelihood asset

Inevitable constraints

	CA adoption constraints
Technical	- Maintaining soil cover (it is an assest for smallholders, competition with livestock) - Weed control (use of herbicides)
Economical	- Unavailable and/or expensive CA inputs and equipment or tools and power sources - Low invesment capacity
Social	- Peer and community pressure - Free grazing on harvested fields - Insecure land tenure

Regional disparities

The Brazilian success story:

- CA was developed to combat soil erosion problems
- Wide adoption of CA in Brazil: 60% of total area
- Multistakeholder participatory strategy (farmers, researchers, private sector)
- Crucial public sector support (R&D, finance, extension)
- Excellent economic and environmental outcomes of CA

Comparison of key issues for CA development in Brazil and East Africa

Issues	Brazil	sub-Saharan Africa
Support systems in place (finance and extension)	well developed	weak (especially finance)
Knowledge and networking	strong links between different actors	initial stages
Synergy between public and private sectors	very active	developing
Private agricultural machinery manufacturing sector	well developed	very weak due to perceived lack of demand
Rural infrastructure	in place	Weak systems (roads, electricity, other services)
Markets for inputs and agricultural produce	functioning	Interventions needed (from government and development agencies)
Availability of adequate farm power	available	severe farm power shortage

The Role of the CA-SARD Project and the African Conservation Tillage Network (ACT)

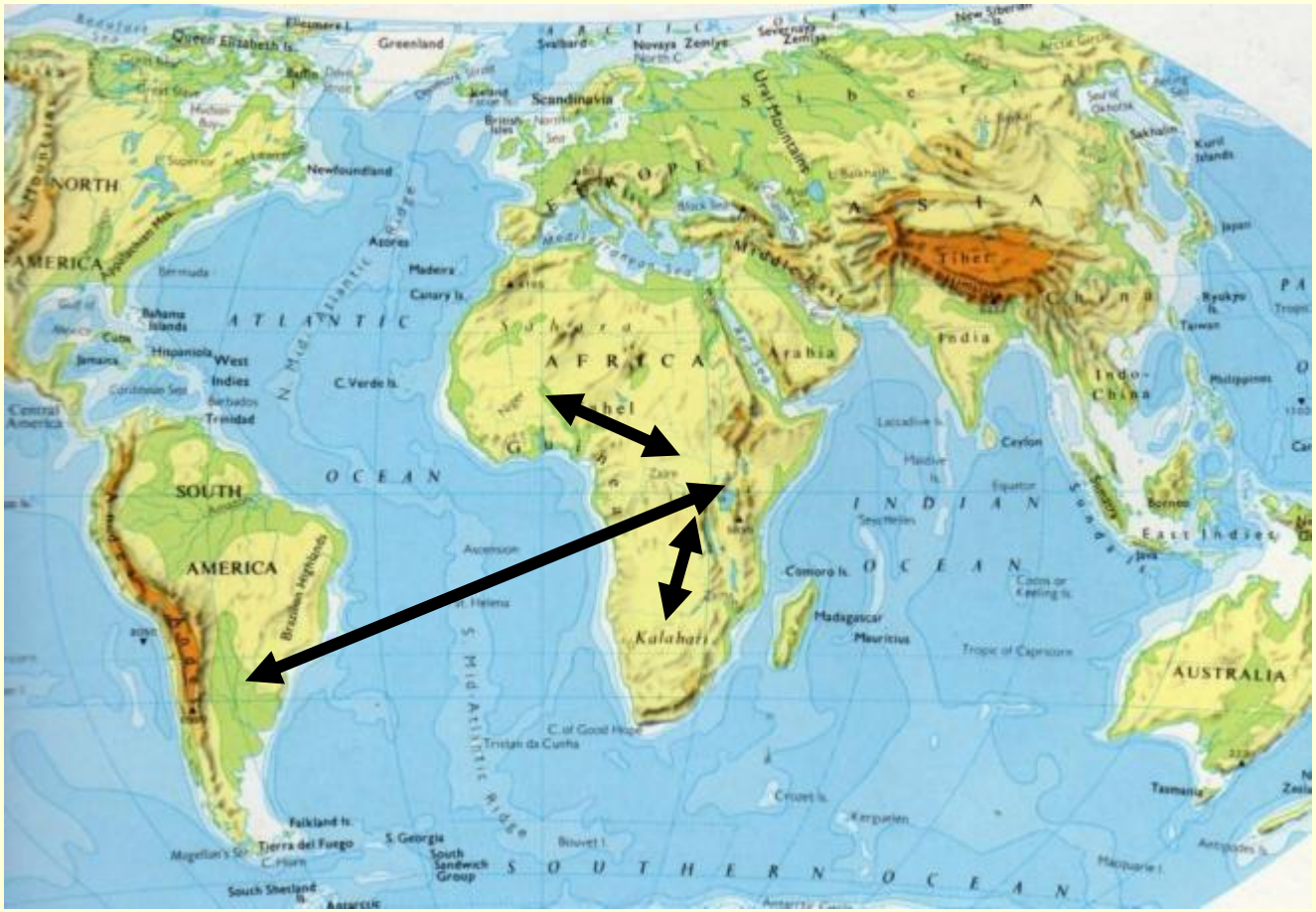
www.act-africa.org

- promote networking for CA adoption
- coordinate the CA-SARD project in Kenya and Tanzania and projects in West-, and Southern Africa

Objectives of the CA-SARD project :

I. Expand adoption of profitable CA practices
II. Enhance supply and availability of CA equipment - especially through private sector participation and networking (Brazil– Africa)
III. Strengthen knowledge sharing and networking (Brazil & East Africa and other African regions)

Aim: Promotion of south-south technology transfer



Activities in Tanzania and Kenya

- FAO/German trustfund for 3 years
- Technology transfer (Latin America – East Africa)
- Direct seeders for animal traction and hand tool level are introduced and imported from Brazil
- Support of local manufacturing in East Africa
- Farmer Empowerment

Results so far:

- Yields are stabilized despite more erratic rainfalls and with less heavy labour inputs
- Soil cover is more accepted after seeing yields increases

FFS - Process to introduce and adapt improved technologies

Farmer groups - participatory extension - FFS

- Farm-level ownership and activities
- Learning by doing and problem solving together
- On-farm adaptation/farmer innovations → **<u>Stimulation is key</u>**
- Integrated M&E seeking benefits for farmers –
- Exchange visits/Field days, links with schools

Knowledge sharing and networking between Brazil and East Africa:

May 2008, Study tour and workshop in Brazil :

- 10 East-African entrepreneurs went to Brazil to interact with their Brazilian counterparts.
- Objective: energize and **stimulate** the East African CA equipment manufacturing sector to produce locally adapted equipment.
- Facilitation of joint venture discussions.

Equipment innovations do happen

Tractors? – rare in rural areas

Cover crops

A field of *Dolichos lablab* where maize will be planted.
The lablab is in the reproductive stage

Dolichos lablab proved very popular

- Provides biomass/residue for soil cover
- Weed suppression - reduced labour requirements for weeding
- Beans offer nutritious food (the young leaves can be used as a vegetable or for fodder)
- Farmers sell the beans – *cash crop*
- Women now fetch a few armfuls of lablab leaves each day feed to their animals

Challenges and stakeholders

production
good agricultural practices
farmer's livelihood

private sector
input supply
marketing

CA

education
empowerment
capacity building

environment
sustainability
public goods

Private sector supply chains are weak

Input Supply Chain:

- Manufacturers (local or international)
- Importers/wholesalers
- Dealers in main cities
- Local stores
- Service providers (operation and maintenance)
- Farmer groups
- Farmers

➔All stakeholders in the supply chain have to make a livelihood from their business/enterprises

➔All stakeholders must be committed

Conclusions

- Potential of CA for reducing drudgery, saving labour, increasing farm power efficiency is real.
- It's an important **opportunity** for smallholder farmers in sub-Saharan Africa – to move on from the hoe.
- It makes the most out of available water particularely associated with climate change variability
- It facilitates the build-up of soil organic matter and hence re-stores soil health and fertility which is key to small farmer livelihoods

Conclusions

Lessons learnt from Brazil for Africa

- Invest in agricultural support systems
- Long-term commitment is essential
- Capacity building at all levels is required (farmers, entrepreneurs, service providers, research, policy makers)
- Stimulation is Key!
- Local manufacture of CA equipment and commercial supply channels need to be supported

Thank you

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www.fao.org/ag/ca

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