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

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

(Derpsch, 2001)
Conservation agriculture

Soil Organic Matter = Drought Resistance

Action of Soil Biota

Structure/Porosity

How does CA work?

Conventional Agriculture

Mechanical Tillage

Biological Tillage

High Soil Organic Matter

low soil organic matter

Zero 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

<table>
<thead>
<tr>
<th>Activity</th>
<th>Systems (hours/ha)</th>
<th>Labour saved by CA over conventional</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conventional</td>
<td>CA</td>
</tr>
<tr>
<td>Land clearance</td>
<td>Slash and carry off the field</td>
<td>Slash and 1 herbicide at plant. time</td>
</tr>
<tr>
<td></td>
<td>115</td>
<td>52</td>
</tr>
<tr>
<td>Land preparation and planting</td>
<td>hand hoe and hand planting</td>
<td>Jab planter</td>
</tr>
<tr>
<td></td>
<td>120</td>
<td>47</td>
</tr>
<tr>
<td>Weeding</td>
<td>Hoe, panga, roguing; 172</td>
<td>Hoe, panga, roguing; 54</td>
</tr>
<tr>
<td>Total</td>
<td>407</td>
<td>153</td>
</tr>
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</table>

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 than 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**

<table>
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<tr>
<th>Technical</th>
<th>CA adoption constraints</th>
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<tbody>
<tr>
<td></td>
<td>- Maintaining soil cover (it is an asset for smallholders, competition with livestock)</td>
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<td>- Weed control (use of herbicides)</td>
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Crop residues are a (short term) livelihood asset.
<table>
<thead>
<tr>
<th>Category</th>
<th>Constraints</th>
</tr>
</thead>
</table>
| Technical         | - Maintaining soil cover (it is an asset 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 investment 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

<table>
<thead>
<tr>
<th>Issues</th>
<th>Brazil</th>
<th>sub-Saharan Africa</th>
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<tbody>
<tr>
<td>Support systems in place (finance and extension)</td>
<td>well developed</td>
<td>weak (especially finance)</td>
</tr>
<tr>
<td>Knowledge and networking</td>
<td>strong links between different actors</td>
<td>initial stages</td>
</tr>
<tr>
<td>Synergy between public and private sectors</td>
<td>very active</td>
<td>developing</td>
</tr>
<tr>
<td>Private agricultural machinery manufacturing sector</td>
<td>well developed</td>
<td>very weak due to perceived lack of demand</td>
</tr>
<tr>
<td>Rural infrastructure</td>
<td>in place</td>
<td>Weak systems (roads, electricity, other services)</td>
</tr>
<tr>
<td>Markets for inputs and agricultural produce</td>
<td>functioning</td>
<td>Interventions needed (from government and development agencies)</td>
</tr>
<tr>
<td>Availability of adequate farm power</td>
<td>available</td>
<td>severe farm power shortage</td>
</tr>
</tbody>
</table>
The Role of the CA-SARD Project and the African Conservation Tillage Network (ACT)

- 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)

www.act-africa.org
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 → **Stimulation is key**
- 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
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
- education
- empowerment
- capacity building
- environment
- sustainability
- public goods

CA
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 particularly 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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http://www.fao.org/ag/ags/