Conservation agriculture in sub-Saharan Africa: Hopes and realities

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Session: Will climate smart agriculture help realise REDD+?

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Definitions

• **CA:** agronomic management practices to achieve sustainable and profitable agriculture, based on three core principles:
  1. Minimum tillage (**MT**): most common aspect of CA in SSA, includes ripping, planting basins, and/or zero tillage
  2. Crop residue retention: at least 30% permanent soil cover
  3. Crop rotation with legumes (for N fixation)

• **CSA,** a broader concept than CA: a set of approaches (including CA) to increase productivity, enhance adaptation/resilience & reduce GHG emissions from agriculture

• **REDD+:** «if you don’t know it by now, you will never never never know it»
ADP ripping

Mec. ripping

Hoe basins

ADP zero till

Source CFU [http://conservationagriculture.org/gallery](http://conservationagriculture.org/gallery); accessed 18.11.14
## CA in sub-Saharan Africa (SSA): Hopes and realities

<table>
<thead>
<tr>
<th>CA hopes</th>
<th>CA realities</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Panacea to low productivity</td>
<td>• Mixed empirical evidence beyond experimental plots</td>
</tr>
<tr>
<td>• Offers immediate yield gains</td>
<td>• Mixed empirical gains, some gains possible after 2 seasons</td>
</tr>
<tr>
<td>• Easies off peak season labor bottle necks</td>
<td>• Labor is a binding constraint at land preparation and during weeding</td>
</tr>
<tr>
<td>• Its cheap/cost effective</td>
<td>• Not to resource poor farmers</td>
</tr>
<tr>
<td>• Highly adopted among smallholders</td>
<td>• Partially adopted, low adoption overall</td>
</tr>
<tr>
<td>• Good for climate adaptation</td>
<td>• Emerging consensus</td>
</tr>
<tr>
<td>• Good for climate mitigation</td>
<td>• Mixed empirical results</td>
</tr>
<tr>
<td>• May help save forests??</td>
<td>• No empirical evidence</td>
</tr>
</tbody>
</table>

Why then is CA promulgated as the next best thing after sliced bread for SSA?
CA adoption in sub-Saharan Africa (SSA)

• Despite nearly three decades of active CA promotion, results on its adoption and impacts remain mixed, why?

• Adoption:
  – ill-definition and measurement of adoption → more next slide
  – Basing adoption estimates on samples drawn exclusively from CA program areas
  – Making inferences from non-statistically representative samples
    • Budget preserving/Impressionistic adoption estimates

• CA yield impacts
  – Most based on experimental plots: on-station and farmer managed with atypical input use and crop management
  – Most rely on bivariate mean comparisons
### CA adoption not as widespread as often claimed

<table>
<thead>
<tr>
<th>Source</th>
<th>Adoption/use rate</th>
<th>Reference period</th>
<th>Definition of adoption/use</th>
<th>Main focus</th>
<th>Sample size (n)</th>
<th>Representativity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arslan et al. (2014)</td>
<td>5%</td>
<td>2007</td>
<td>Zero till/basins, crop rotation</td>
<td>CA</td>
<td>8,000</td>
<td>Yes</td>
</tr>
<tr>
<td>Grabowski et al. (2014)</td>
<td>13%</td>
<td>2011</td>
<td>Ripping/basins</td>
<td>MT</td>
<td>1,452 LF*</td>
<td>No</td>
</tr>
<tr>
<td>Kasanga and Daka (2013)</td>
<td>41%</td>
<td>2012</td>
<td>Undefined</td>
<td>MT, CF, CA</td>
<td>3,200</td>
<td>No</td>
</tr>
<tr>
<td>Kuntashula et al. (2014)</td>
<td>12%</td>
<td>2011</td>
<td>Ripping/basins</td>
<td>MT</td>
<td>1,600</td>
<td>No</td>
</tr>
<tr>
<td>Ngoma et al. (2014)</td>
<td>4%; national, &lt;10% in top 10 districts</td>
<td>2012</td>
<td>Ripping/basins as main tillage at plot level</td>
<td>MT</td>
<td>63,000</td>
<td>Yes</td>
</tr>
<tr>
<td>Ngombe et al. (2014)</td>
<td>33%</td>
<td>2007</td>
<td>Any of 3 core CA</td>
<td>CA</td>
<td>8,000</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Andersson and D'Souza (2014)’s lit. review of CA adoption claims in SSA conclude

“sensu stricto, adoption of CA based on the three core principles in SSA is more limited than is deemed”

* Lead farmers
**But CA has positive yield impacts**

<table>
<thead>
<tr>
<th>Source</th>
<th>Type of study</th>
<th>Main focus</th>
<th>Crop</th>
<th>Yield gain (+/-) Kg/ha</th>
<th>Time lag to Gain (years)</th>
<th>Validity (internal or External)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ngoma et al. (forthcoming)</td>
<td>OBS</td>
<td>MT</td>
<td>Maize</td>
<td>191-814</td>
<td>unspecified</td>
<td>both</td>
</tr>
<tr>
<td>Ngwira et al. (2012)</td>
<td>EXP</td>
<td>CA</td>
<td>Maize</td>
<td>+4,000</td>
<td>1 Season</td>
<td>Internal</td>
</tr>
<tr>
<td>Rockström et al. (2009)</td>
<td>EXP</td>
<td>CA</td>
<td>Maize</td>
<td>1,200-2,000</td>
<td>unspecified</td>
<td>Internal</td>
</tr>
<tr>
<td>Thierfelder et al. (2013)</td>
<td>EXP</td>
<td>CA</td>
<td>Maize</td>
<td>75-91%</td>
<td>3-5 seasons</td>
<td>internal</td>
</tr>
</tbody>
</table>

1 Exp=experimental designs, obs= observational survey data

**In summary:**
CA does hold some potential to positively influence crop yields in SSA. But realizing & addressing the constraints to its widespread adoption is crucial.
Ag. land expansion survey (AgLES14)

• Survey done in Mumbwa, Mpika and Nyimba districts of Zambia in October 2014
  – *Sampling frames from the CSO/MAL crop forecast surveys*

• Randomly selected 10 work areas per district and 12 households (minimum) per work area.
The REDD+ - CA nexuses: Prelims from AgLES14

Ag land expansion 2013/14 season

Expanded ag. land into

Ag land expansion next 5 yrs

*MT*=0.59 ha,  non *MT*=0.66 ha

*MT*=1.53ha,  non *MT*=0.98 ha
Concluding remarks

- CA adoption remains low in SSA
- CA has potential to raise crop yields
  - But farmers may maximize labour (not land) productivity
- Will CA help save forests?

**Farmer perceptions of CA effects on ag. land expansion**

**Willingnes to participate in REDD+?**

Farmers are not sure, the researchers are not either…. … but many policy makers seem to be ….
References


