



## TAILORING CONSERVATION AGRICULTURE TO LOCAL CONTEXTS AND CONDITIONS OF SMALLHOLDER FARMERS IN AFRICA

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# Background

- 'Push' of Conservation Agriculture in Sub Saharan Africa as a means to overcome continuing poor-profitability, food insecurity and soil degradation on smallholder farms
  - FAO, Worldbank
  - Several donors: SIDA, Norway, USAID, DFID, AFD, ..
  - Several NGOs: CARE international, Worldvision, Foundations for Farming, ...
  - Research institutes such as CIMMYT, ICRISAT, ICARDA and CIRAD
  - Governments in southern and eastern Africa have endorsed CA as a pathway to food security
  
- Often promoted as a "panacea"

« **In Zambia**, conservation agriculture has helped vulnerable households pull through drought and livestock epidemics. **In the 2000-2001 drought, farmers who used conservation agriculture managed to harvest one crop, others farming with conventional methods faced total crop failure.**» FAO news release October 4, 2005

# Conservation agriculture

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□ 3 principles underpin CA: (FAO [www.fao.org/ag/ca](http://www.fao.org/ag/ca))

1. Minimize soil disturbance by reduced or zero-tillage

2. Keep the soil covered with  
harvest residues  
cover

3. Use crop rotation



# Many CA systems



**Planting lines with Magoye ripper –  
minimum tillage**



**Direct seeding – no tillage**



**Jab-planter – no-tillage**



**Planting basins –  
Conservation Farming, Zai**

# Low adoption rates in SSA

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- ❑ CA has been widely adopted by farmers in North and South America,- and in parts of Asia
- ❑ Much less success with smallholders in Africa despite > 2 decades of research and development investments

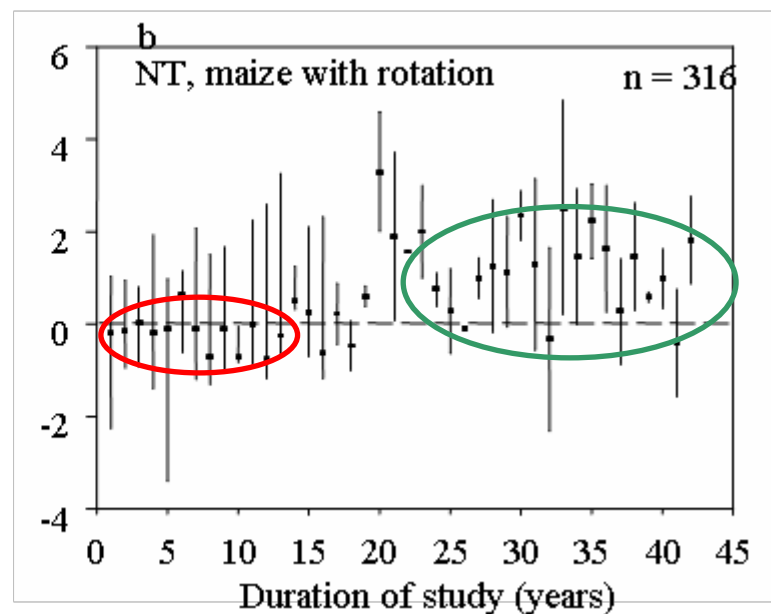
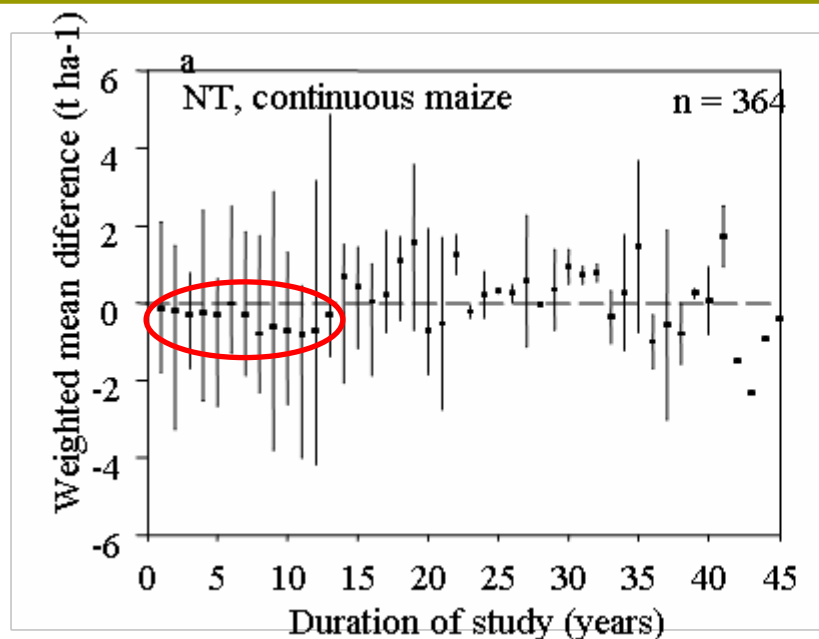
	in 1000 ha	CA % of cropland
Argentina	19719	58.8
Brazil	25502	38.3
Australia	12000	26.9
Canada	13481	25.9
USA	26500	15.3
South Africa	368	2.4
Zambia	40	0.8
Kenya	33	0.6
Zimbabwe	15	0.4
Mozambique	9	0.2
Morocco	4	0.1

# Major constraints for adoption/challenges for research and development

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1. Yield benefits usually in the long term, while costs are immediate
2. Strong trade-offs with other activities at the farm level and above
3. Poor functioning of and access to (input) markets
4. Knowledge-intensive nature of implementing CA
5. Need for 'tailoring' CA to the huge diversity of farmers, local practices and local / regional environments

# 1. Yield benefits in the long term: meta-analysis



Source: Rusinamhodzi, Corbeels, van Wijk, Rufino, Nyamangara and Giller (2010) *Agronomy for Sustainable Development* (in review)

- Yield benefits from CA are mostly realized in the long-term, - and when rotations are applied
- Short-term yield reductions: requires further research
- Farmers often attribute higher value to immediate benefits and costs than those realized or occurred in future

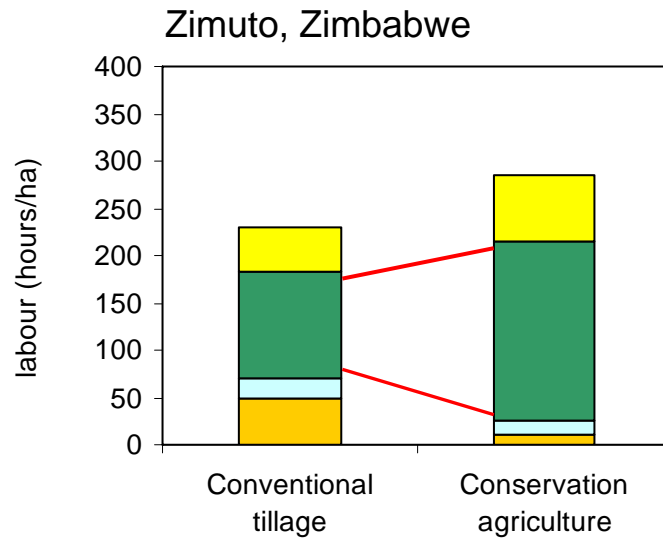
## 2. Strong trade-offs of implementing CA

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- ❑ Competing uses for crop residues, preventing their availability for mulching;
  - feed is typically in short supply and takes preference
  - especially under semi-arid conditions (where livestock is of great importance and biomass production is low)
  - often non-exclusive products/communal land use: free grazing – local by-laws?
- ❑ The reallocation of labour, especially to weeding



## 2. Strong trade-offs of implementing CA



Source: Siziba (2008) PhD thesis, University of Hohenheim

- CA without herbicides increases labour demand for weeding
- Implying a shift of work
  - from mechanized to manual labour
  - from men to women

### 3. Poor functioning of markets

- Limited access to inputs: no-till equipment, herbicides, and fertilizer
  - Expensive
  - Lack of effective input supply chain



## 4. Knowledge-intensive nature of implementing CA

- ❑ Implementing CA successfully requires understanding and/or making use of ecological principles
- ❑ 'Full' CA systems require major simultaneous changes in soil/crop management
- ❑ CA requires significant capacity building (farmers, extension, research)
- ❑ As a results- adoption is unlikely to be 'immediate'



## 5. Need for tailoring CA

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- ❑ Potential of CA is site- and farmer-specific
- ❑ and thus depends on local bio-physical, socio-economic and institutional conditions
- ❑ Major challenge for research community: assess *where*, *which* and *for whom* CA practices may best fit?



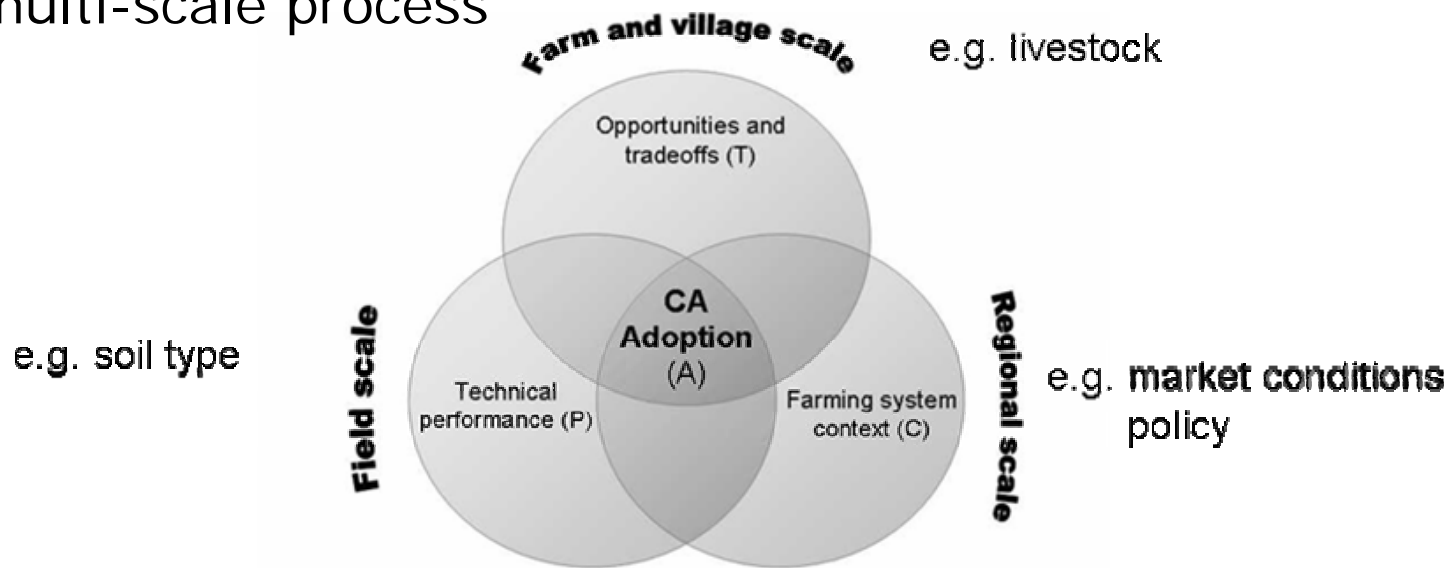
# 5. Need for tailoring CA: framework for 'ideotyping'

## Likelihood of adoption by farmers?

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- ❑ Flat land
  - ❑ Clayey soils
  - ❑ Poor productivity
  - ❑ Many livestock
  - ❑ Little capacity to invest
  - ❑ Unsecure access to land
  - ❑ Poor markets
  - ❑ Poor institutional environment
  - ❑ Steep slopes
  - ❑ Sandy/loam soils
  - ❑ Abundant biomass
  - ❑ Few livestock
  - ❑ Wealthier farmers who can afford inputs
  - ❑ Stable land tenure arrangements
  - ❑ Good markets
  - ❑ 'Enabling' institutional environments

# CA, a complex innovation process

## □ A multi-scale process



$$\text{Adoption} = \text{Performance} + \text{Tradeoffs} + \text{Context} + (P \times T \times C)_{\text{interactions}}$$

- At each scale opportunities and constraints exist that may favour or impede the adoption of CA
- Technical performance (yield) is clearly but one of the determinants of adoption
- CA is a successful 'innovation' when fully embedded in contexts of the 3 scales

# CA, a complex innovation process

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## □ A multi-stakeholder innovation process



- Non-linear, but interactive approach
- Getting the right stakeholders on-board with their adequate role
- Key role of farmers & their associations



## In summary: 5 key points

- ❑ Three CA principles but huge diversity of possible CA systems
- ❑ CA offers potential yield benefits, especially in the long-term and with « full » CA
- ❑ Many R&D challenges in « fitting » CA to local conditions and achieving adoption among smallholders in SSA
- ❑ Complex, multi-scale, multi-stakeholder nature of a successful CA innovation process
- ❑ Markets, policy and institutional issues are crucial



# Did we fail in Africa with CA?

- Lead questions for a fruitful debate:
  - Is the situation for CA development in Africa different from elsewhere?
  - Is it more a question of technologies, or a question of approach to innovation?
  - Does CA addresses a need identified by farmers or by agronomists?