

# Conservation agriculture and smallholder farming in Africa:

## The heretics' view

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Plant Production Systems,

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# Background

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- **Conservation agriculture being promoted as a panacea**
- **Univocal promotion by international organizations, NGOs (and churches!) is stifling debate**  
*e.g. ....“the plough is the enemy of sustainability”*

See <http://www.farming-gods-way.org/>

## **We have two main arguments:**

- 1. Scientific evidence to support the claims made for CA is unclear and inconsistent**
- 2. CA does not ‘fit’ within the majority of smallholder farming systems in Africa**

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Giller, K.E., Witter, E., Corbeels, M., Tittonell, P., 2009. Field Crops Research 114, 34.



**Care of Creation**

*pursuing a God-centered response  
to the environmental crisis*

*all things were created by Him and for Him*  
Colossians 1:16



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What We Do

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Promoting a God-Centered  
Vision

Planting God's Trees

Harvesting God's Water

**Farming God's Way**

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## WE ARE ALSO AT WORK IN

...

the USA

## Farming God's Way

CCK is working to promote a biblical perspective on farming that connects the Christian faith with the most common vocation on the continent.

Based on the proven techniques of conservation agriculture, this is a program originally developed in Zimbabwe that uses scientifically sound, no-till agricultural techniques combined with strong biblical teaching to radically transform farming practices and bring hope to farmers (read more about farming God's way [here](#)).



In many areas, Farming God's Way has produced dramatic increases in yield. The beauty of this technique is that it protects and improves the productivity of the land at the same time, reducing the need for chemical fertilizer or pesticide application.

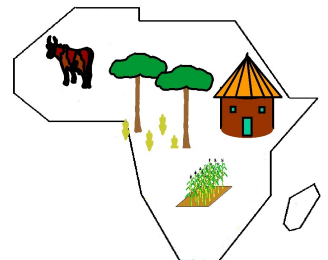
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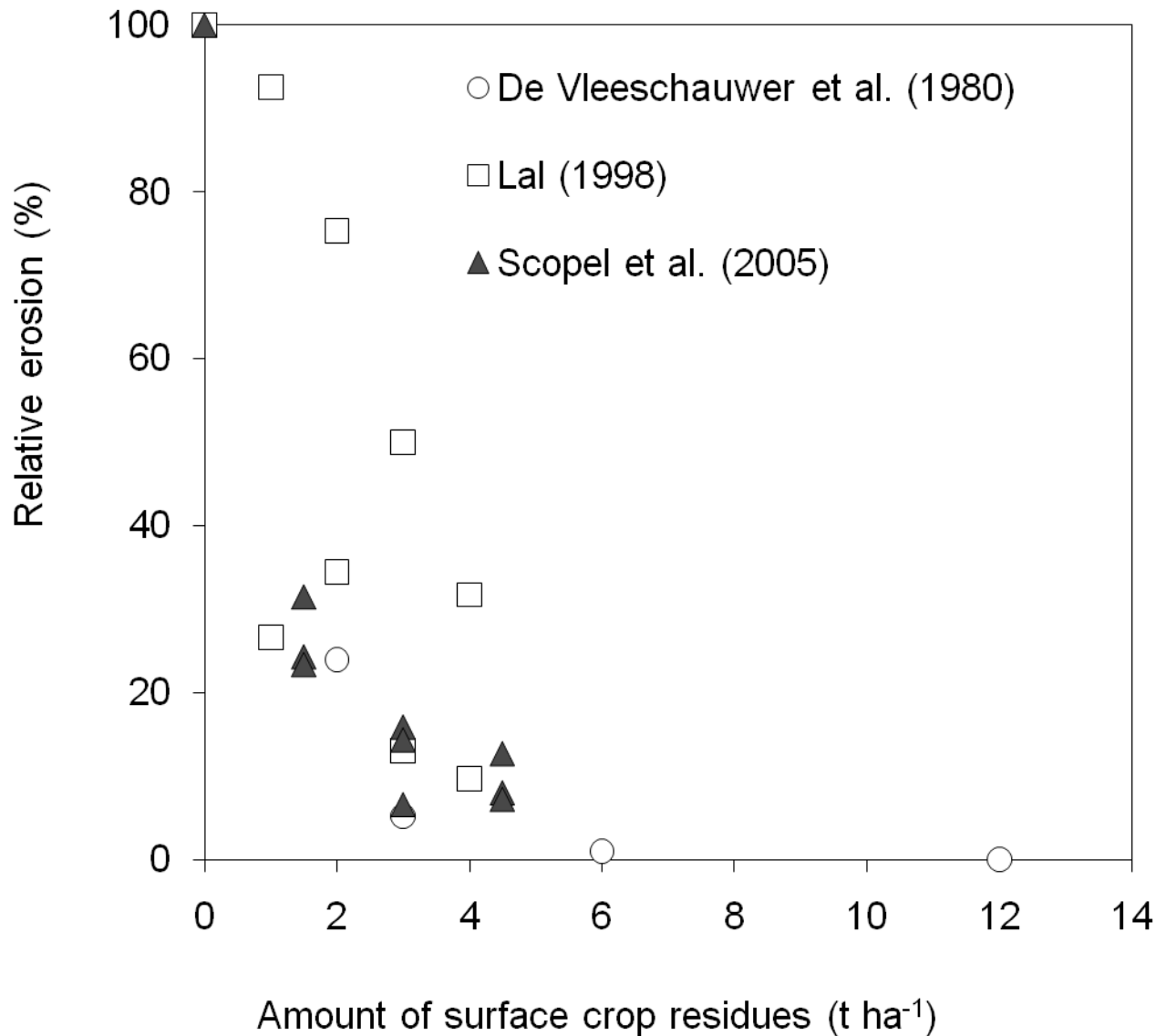
# Principles of Conservation Agriculture

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- 1. Minimum or no mechanical soil disturbance**
- 2. Permanent organic soil cover - maintenance of crop residues to achieve >30% soil cover**
- 3. Diversified rotations (with legumes)**



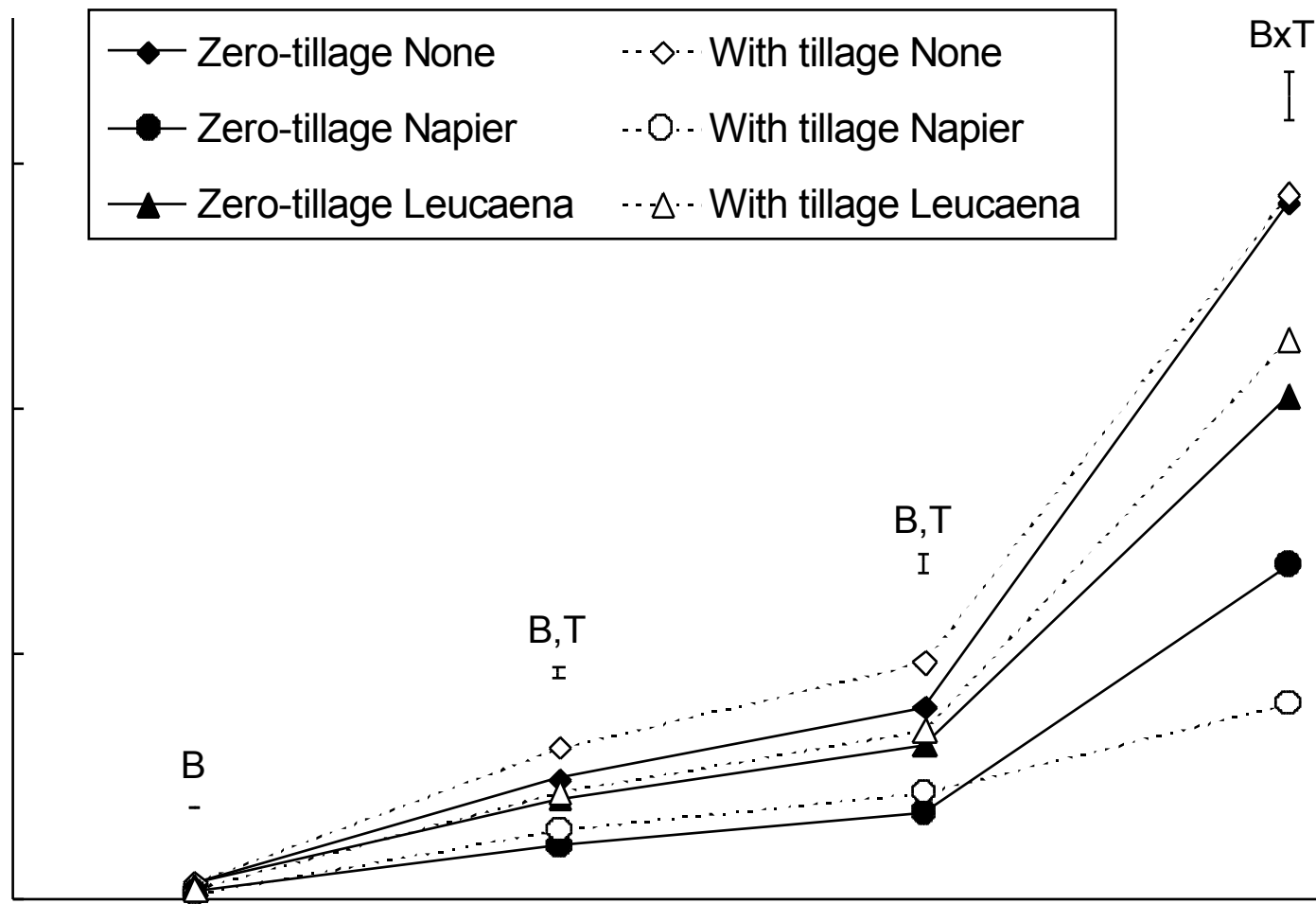
# Is mulch the best way to use crop residues?



# CA on steep slopes in Central Kenya



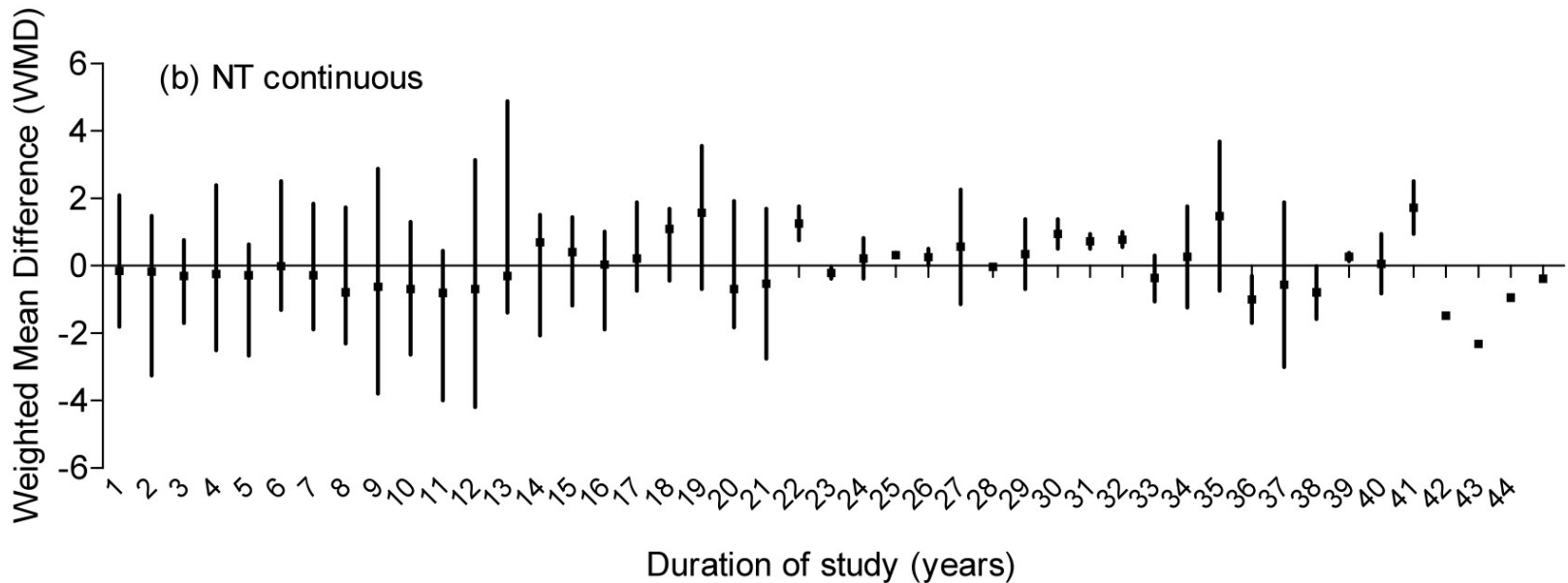
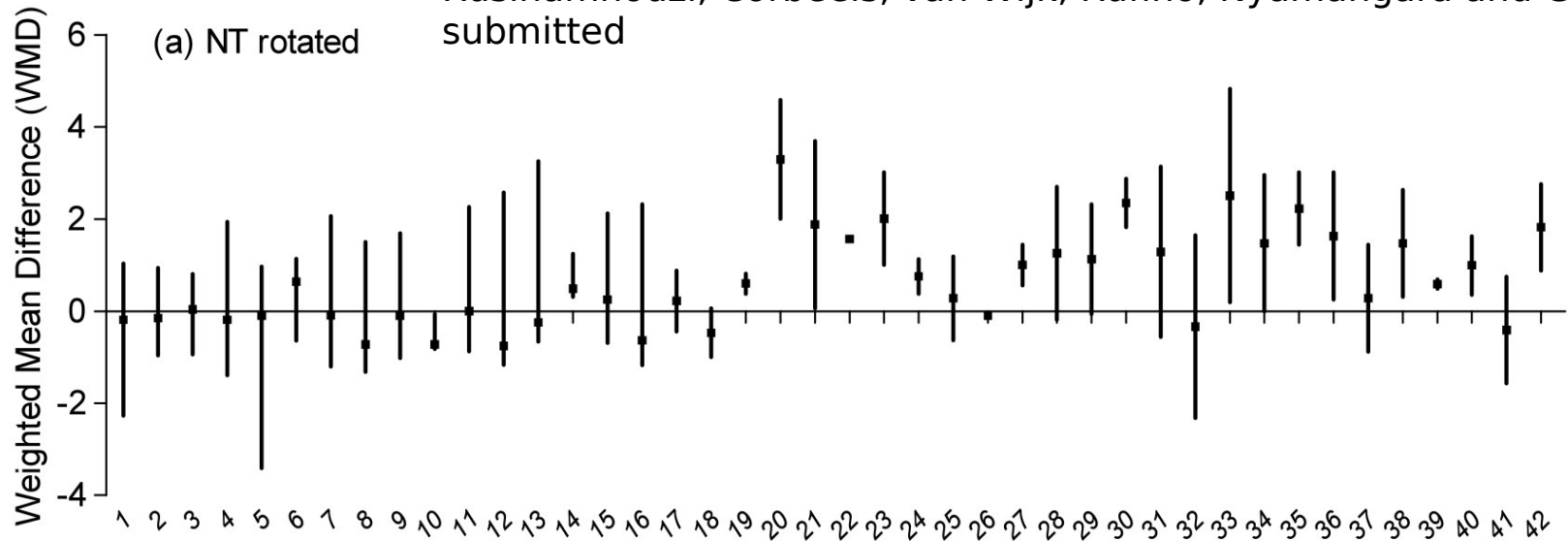
# CA and soil erosion on steep slopes in Central Kenya





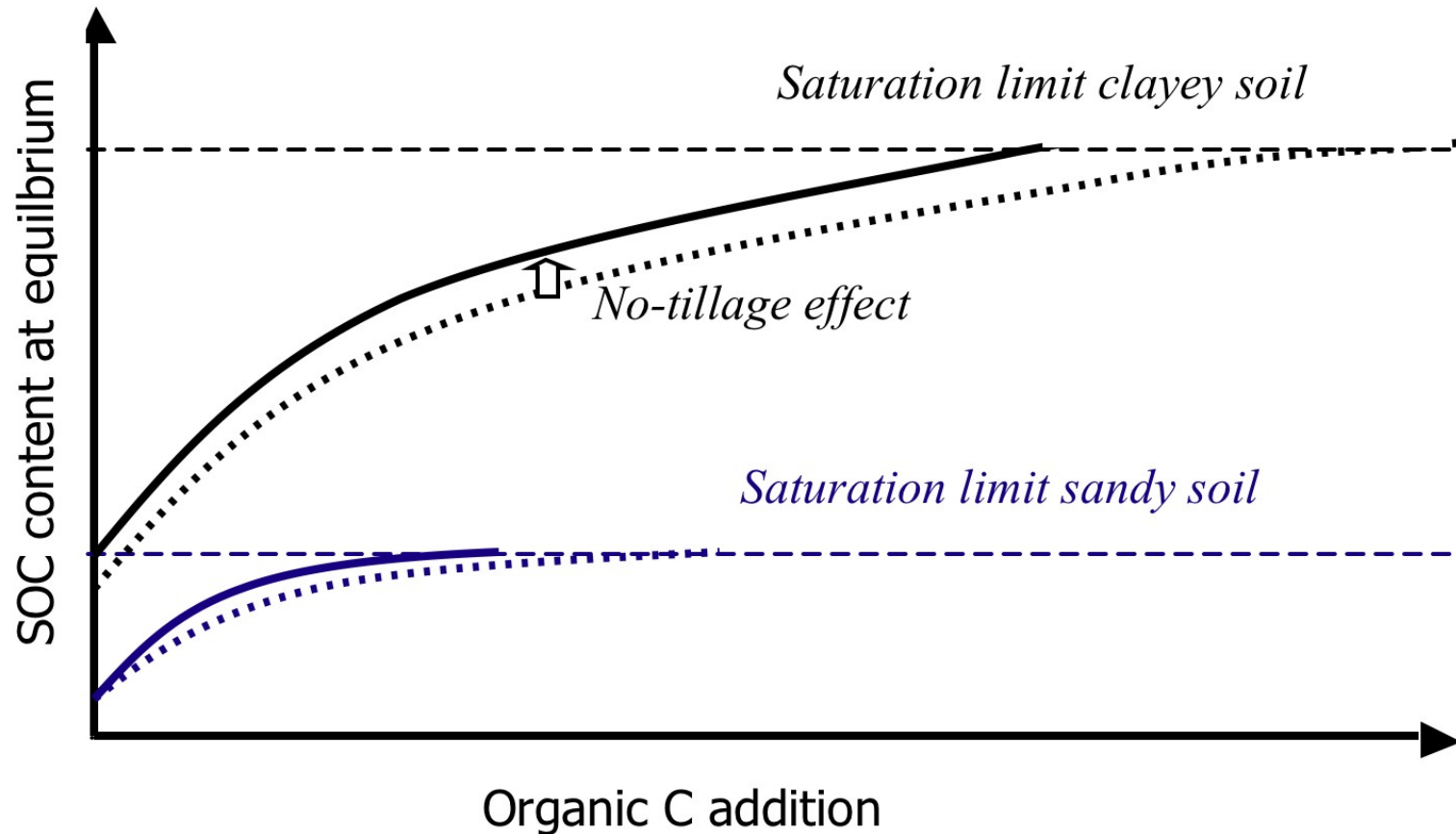
# Does CA lead to increased yields?

Rusinamhodzi, Corbeels, van Wijk, Rufino, Nyamangara and Giller, submitted



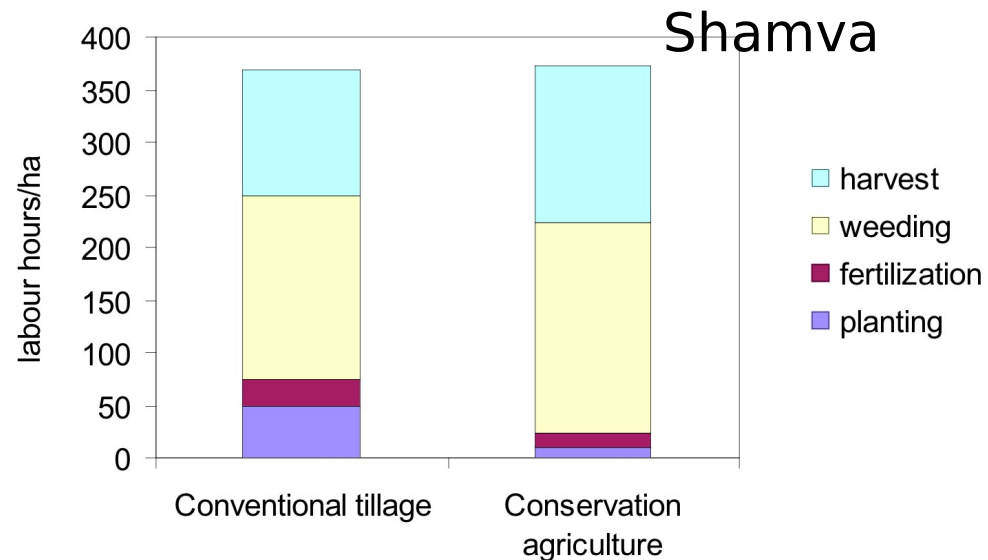
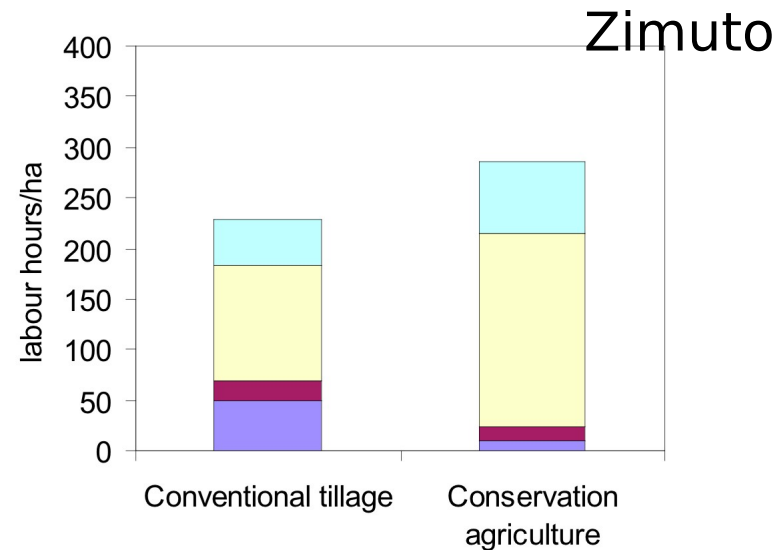


# Does CA lead to increased soil carbon?



# Does CA save labour?

- CA without herbicides increases labour demand for weeding
- Shifts labour demand from men to women

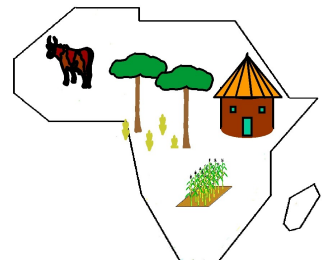


# Does CA 'fit'?

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**We have two main arguments:**

- 1. Scientific evidence to support the claims made for CA is unclear and inconsistent**
- 2. CA does not 'fit' within the majority of smallholder farming systems in Africa**



# An 'uniquely' African green revolution

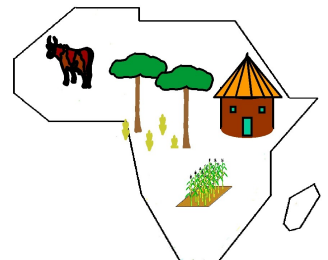
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Kofi Annan called for '*an uniquely African green revolution in the 21st Century*'

Recognising:

- the rich diversity of Africa's people, soils and farming practices
- the urgent need to increase agricultural productivity

**But how do we target technologies to the huge diversity and heterogeneity of African farming systems?**



# The underlying problem - poor soil fertility





# Potential solutions - Nitrogen fixing legumes

**Legume green manures**



**Grain legumes**



**Legume tree fallows**



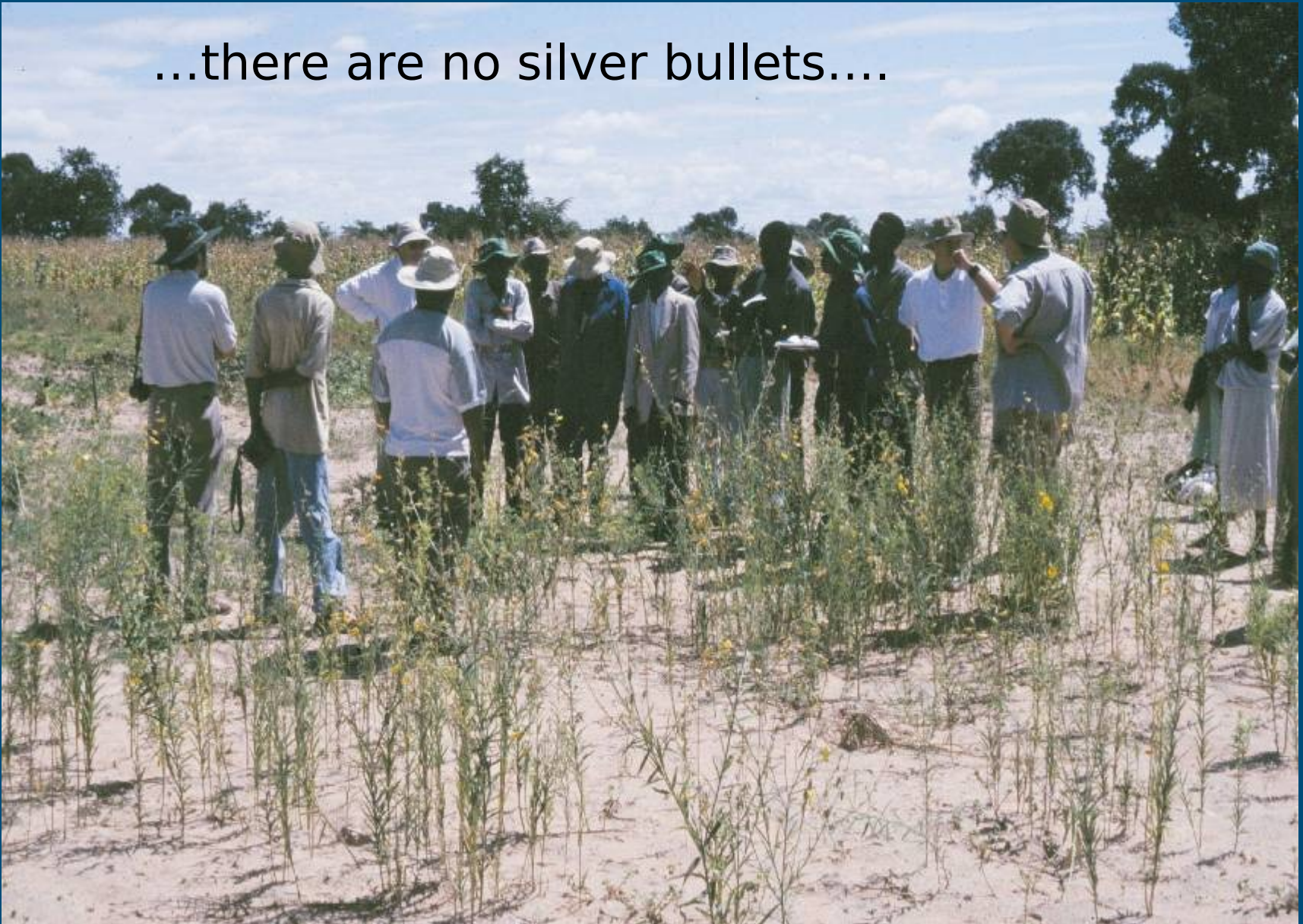
**Legume forages**





# Green manures on smallholder farms

...there are no silver bullets....

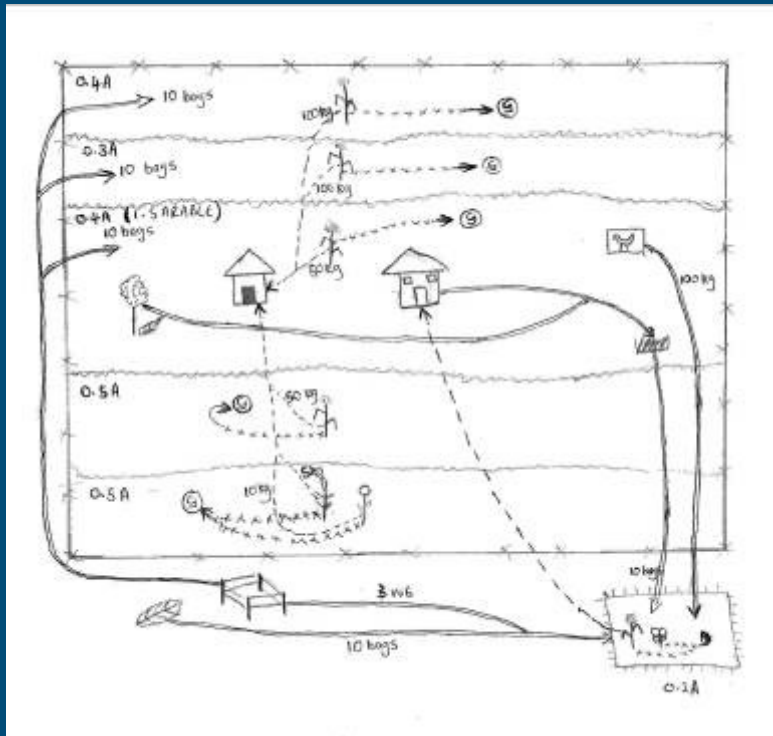




# Resource flow mapping of smallholdings

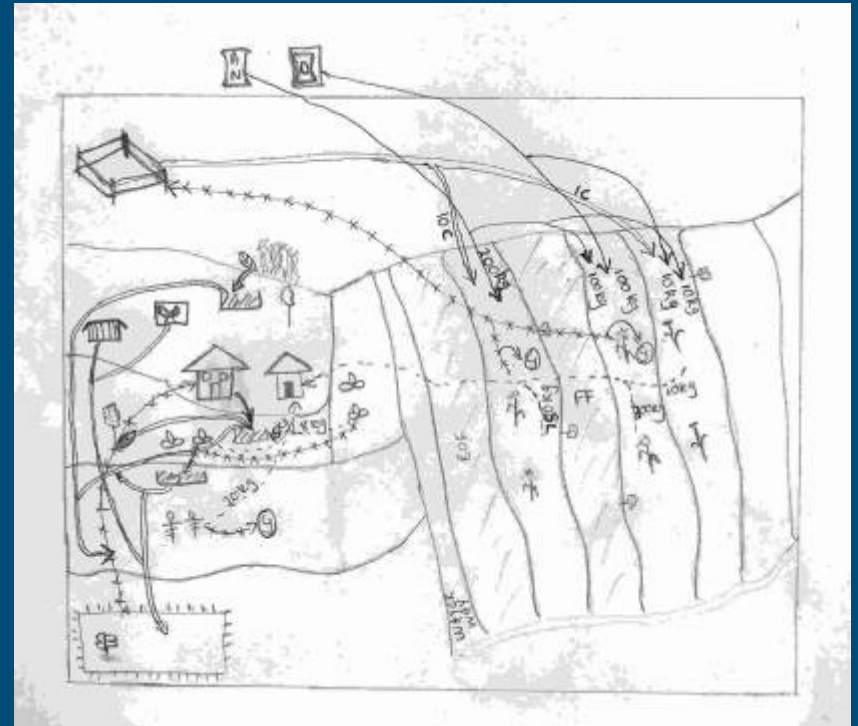
# Farmer Martha Murewa, Zimbabwe

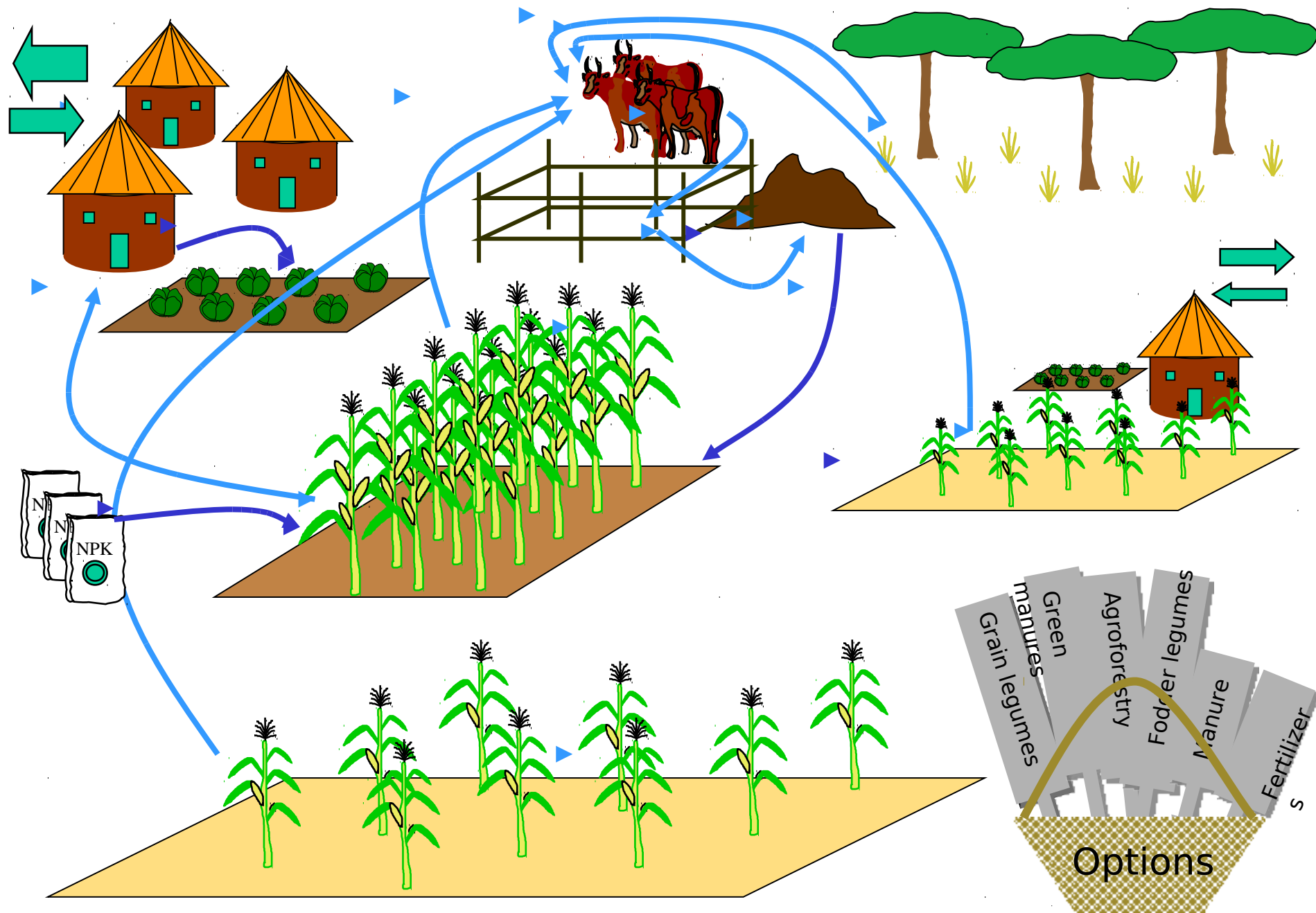
Manages 6 fields (0.9 ha)  
Labour available - 1 full time  
1 chicken  
Earns manure for homegarden



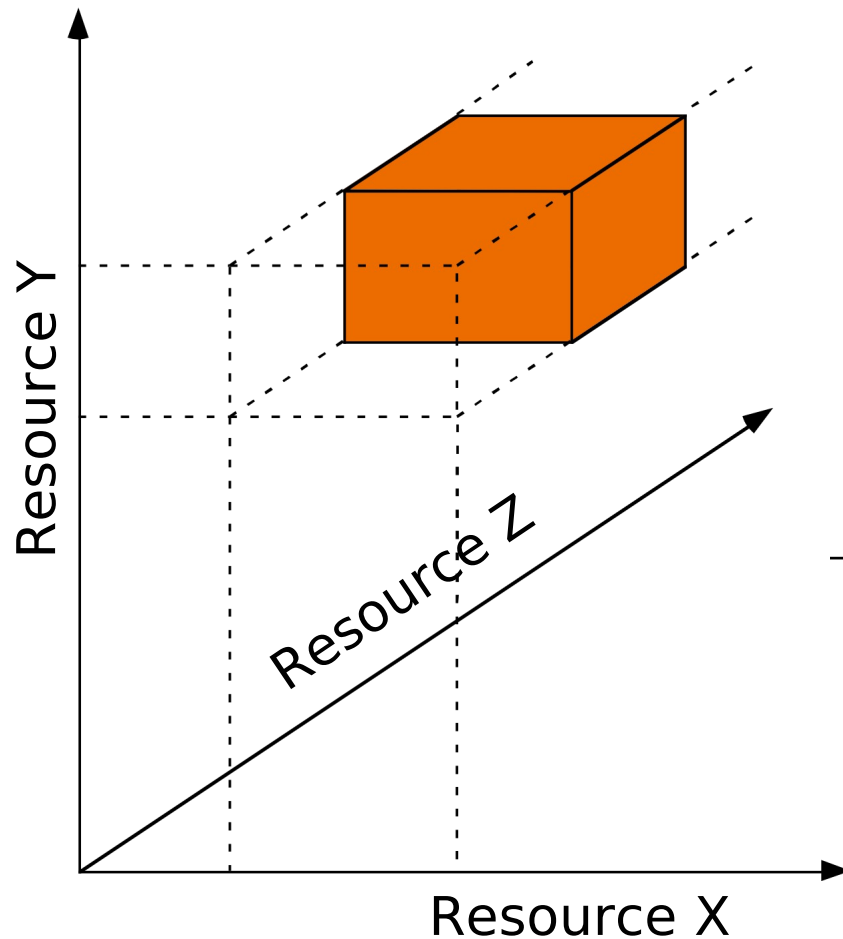
# Farmer Thomas Murewa, Zimbabwe

Manages 4 fields (3.3 ha)  
Labour available - 3 full time  
11cattle, 2 goats, 6 chickens  
Uses manure and fertilizers



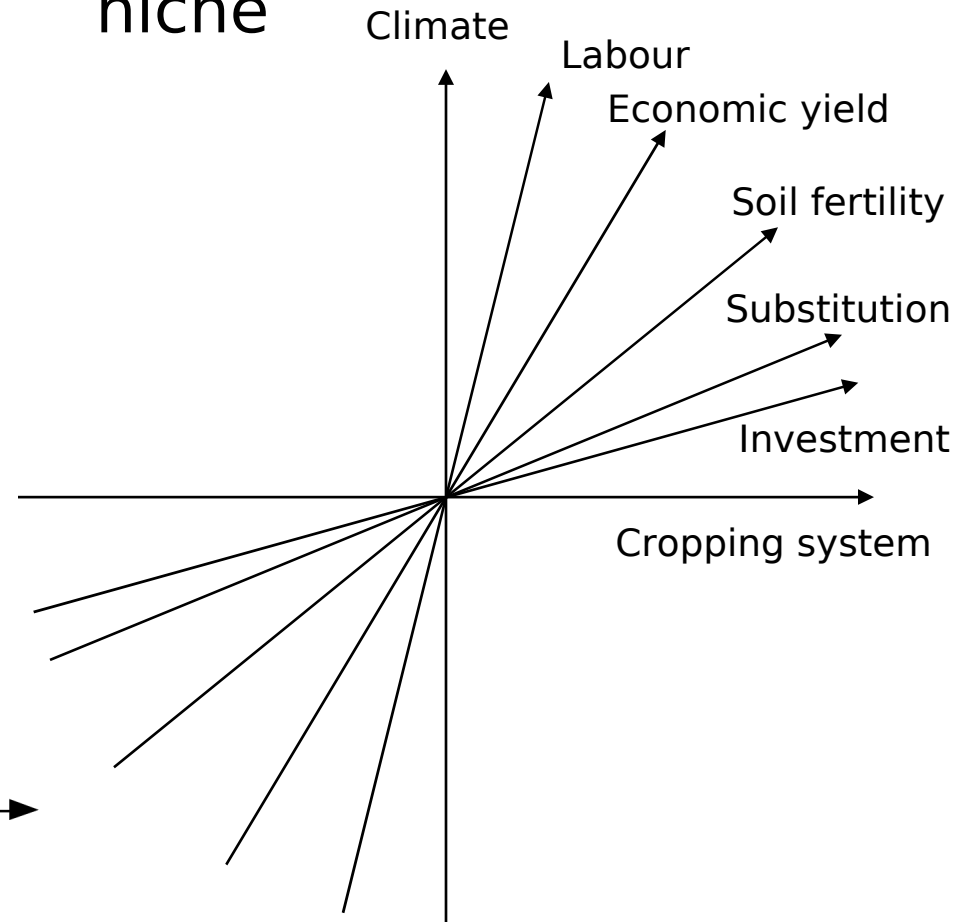


# The 'niche' for legumes



The niche as an 'n'-dimensional hyperspace  
Hutchinson (1957)

## The socio-ecological niche

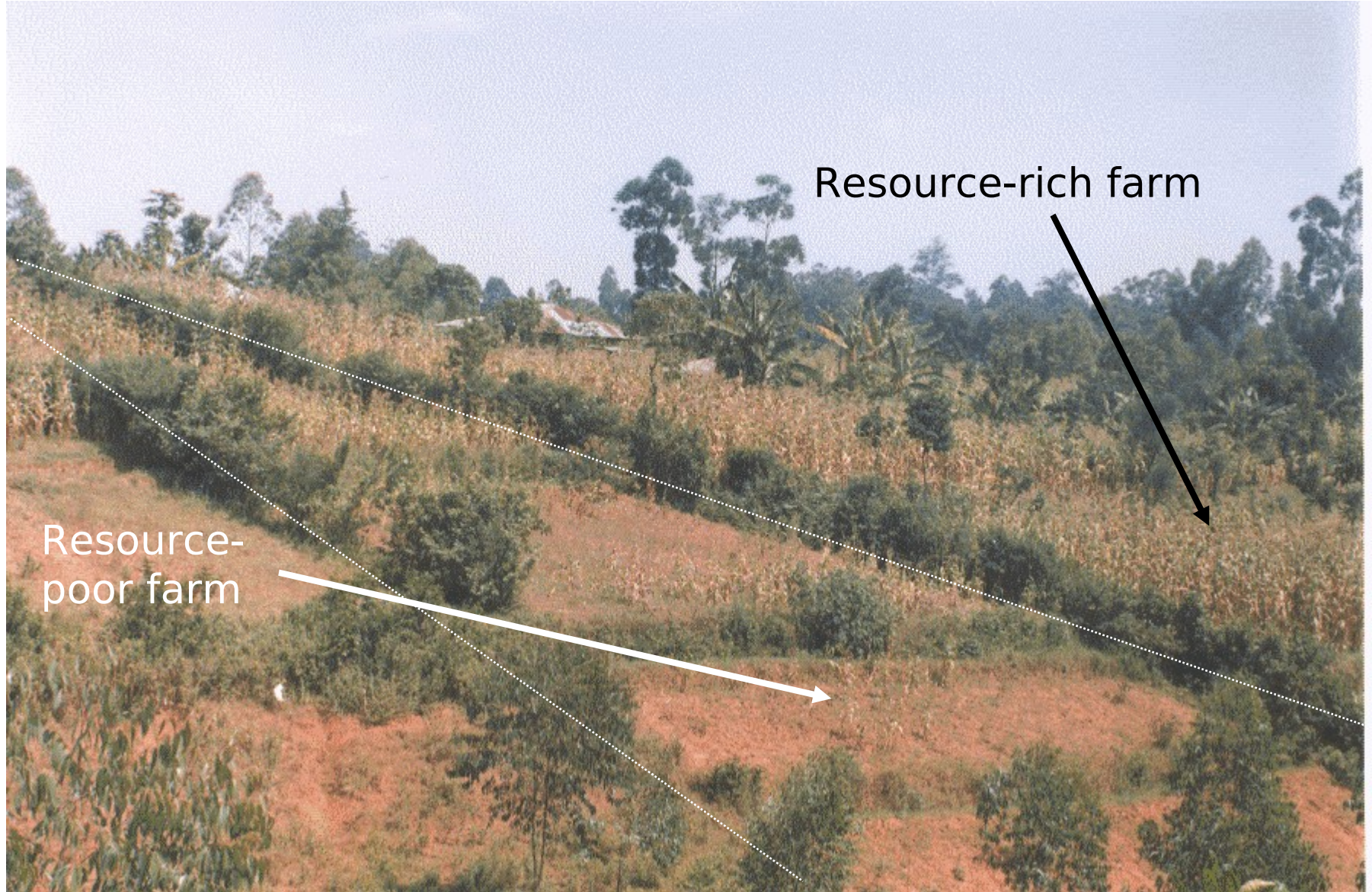


The legume 'niche' has agroecological  
and socioeconomic dimensions

Ojiem, de Ridder, Vanlauwe & Giller (2006)  
) *Int. J. Agric. Sust.* **4**, 79-93.



# Poverty leads to soil degradation - western Kenya

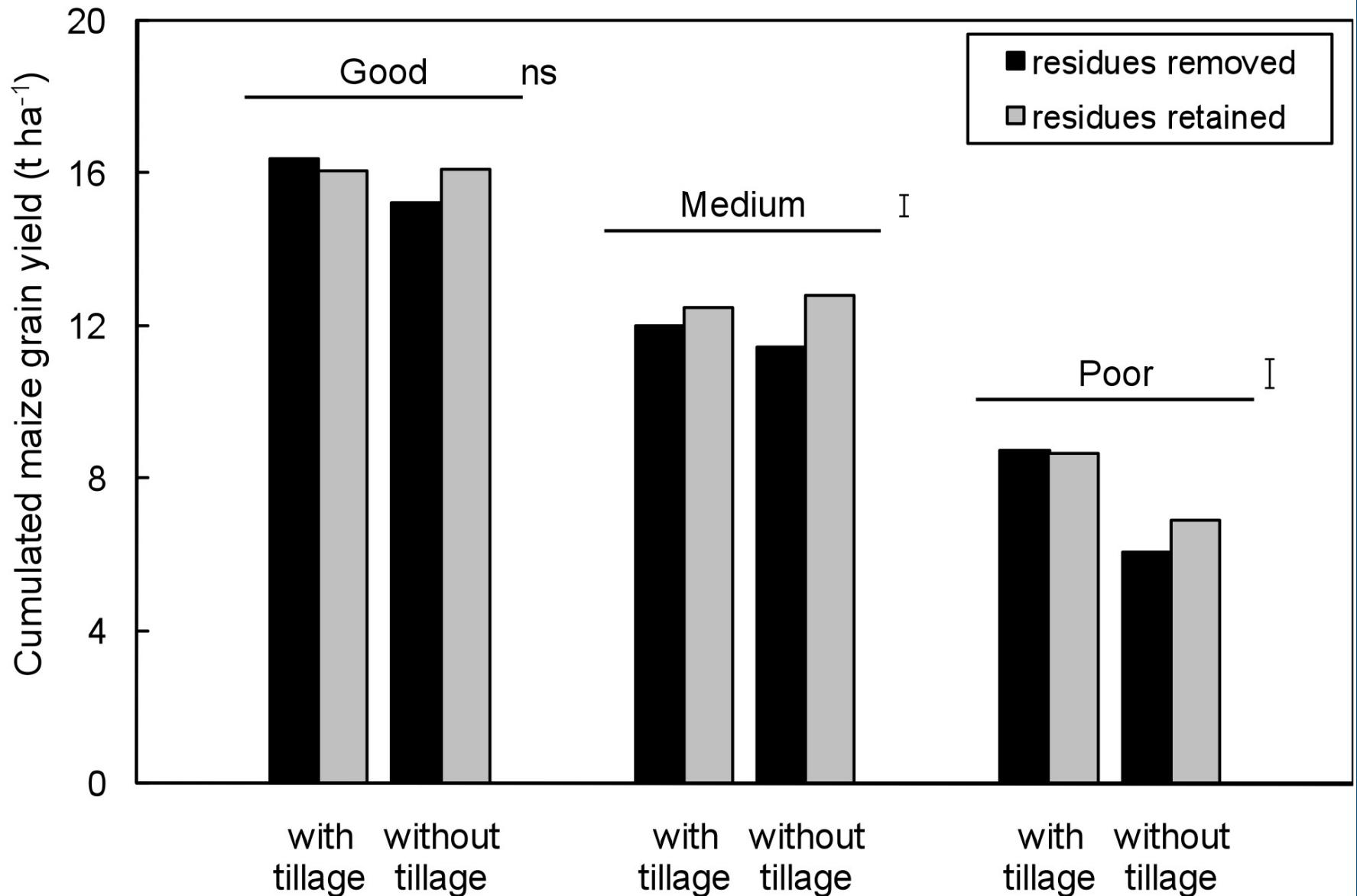








# CA in Central Kenya on diverse fields



# **But how can we rehabilitate degraded soils?**

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**Is enough manure available?**

**Are there enough crop residues?**



# Competition for crop residues



# Competition for crop residues



Maize harvesting in Murewa, April 2010

# Likelihood of adoption by farmers?



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

# Does CA 'fit'?

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## **We conclude:**

- 1. Scientific evidence to support the claims made for CA is unclear and inconsistent**
- 2. CA does not 'fit' within the majority of smallholder farming systems in Africa**
- 1. A more subtle and differentiated understanding of the farming systems and aims of smallholder farmers is required**

