

# Integrated fertilization from a smallholder farmer view: constraints and potential of different African Farmers

Cargele Masso & Bernard Vanlauwe,

[C.Masso@cgiar.org](mailto:C.Masso@cgiar.org) & [B.Vanlauwe@cgiar.org](mailto:B.Vanlauwe@cgiar.org)

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# Integrated soil fertility management (ISFM)

‘The application of soil fertility management practices, consideration of improved **germplasm**, and the knowledge to adapt these to **local conditions**, which **maximize fertilizer** and other agro-input **use efficiency** and crop productivity.

# Variability in soil fertility

Same farm...  
Same variety...  
Same inputs...  
Same management...  
Same weather...

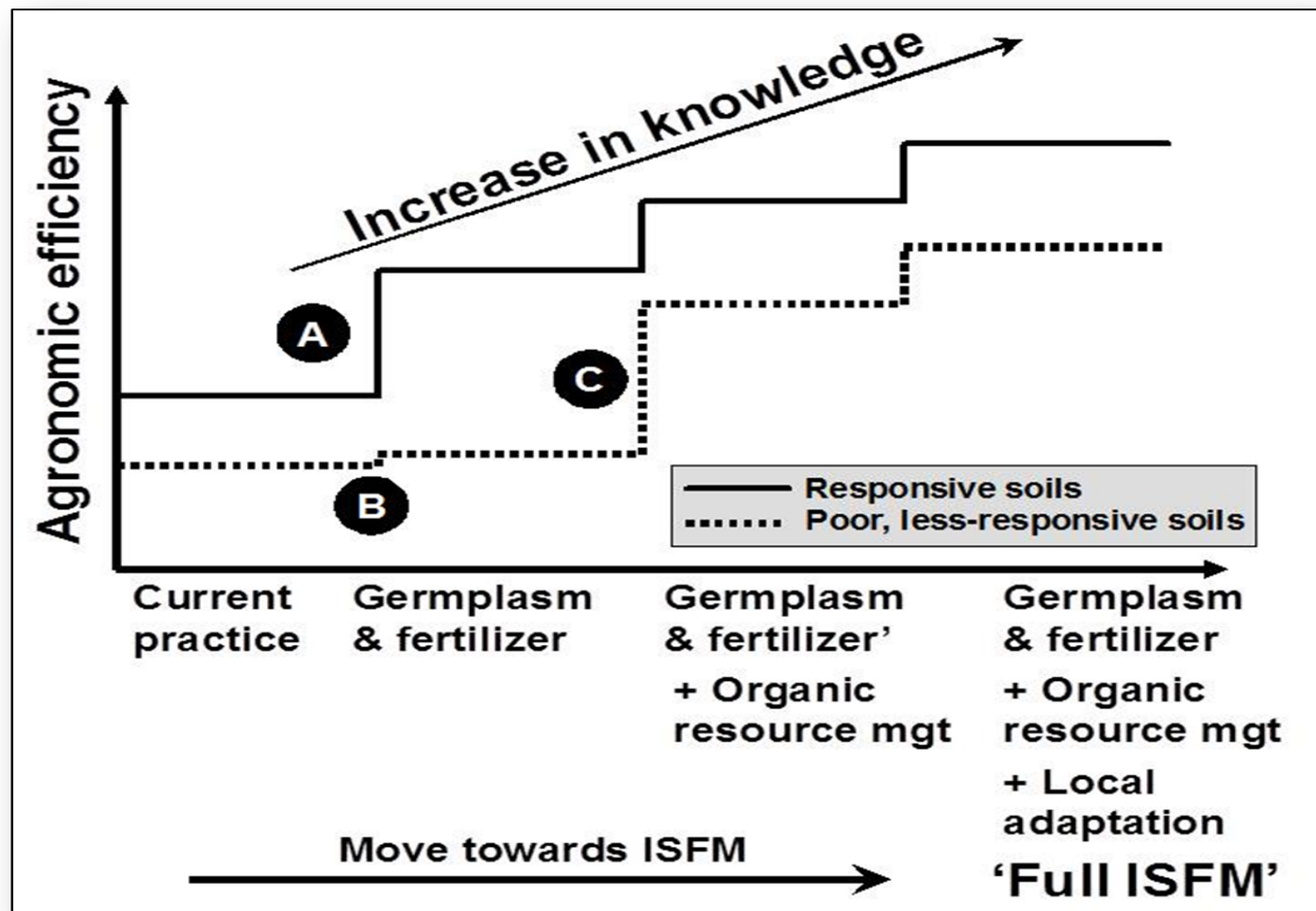
Poor soil



Good soil



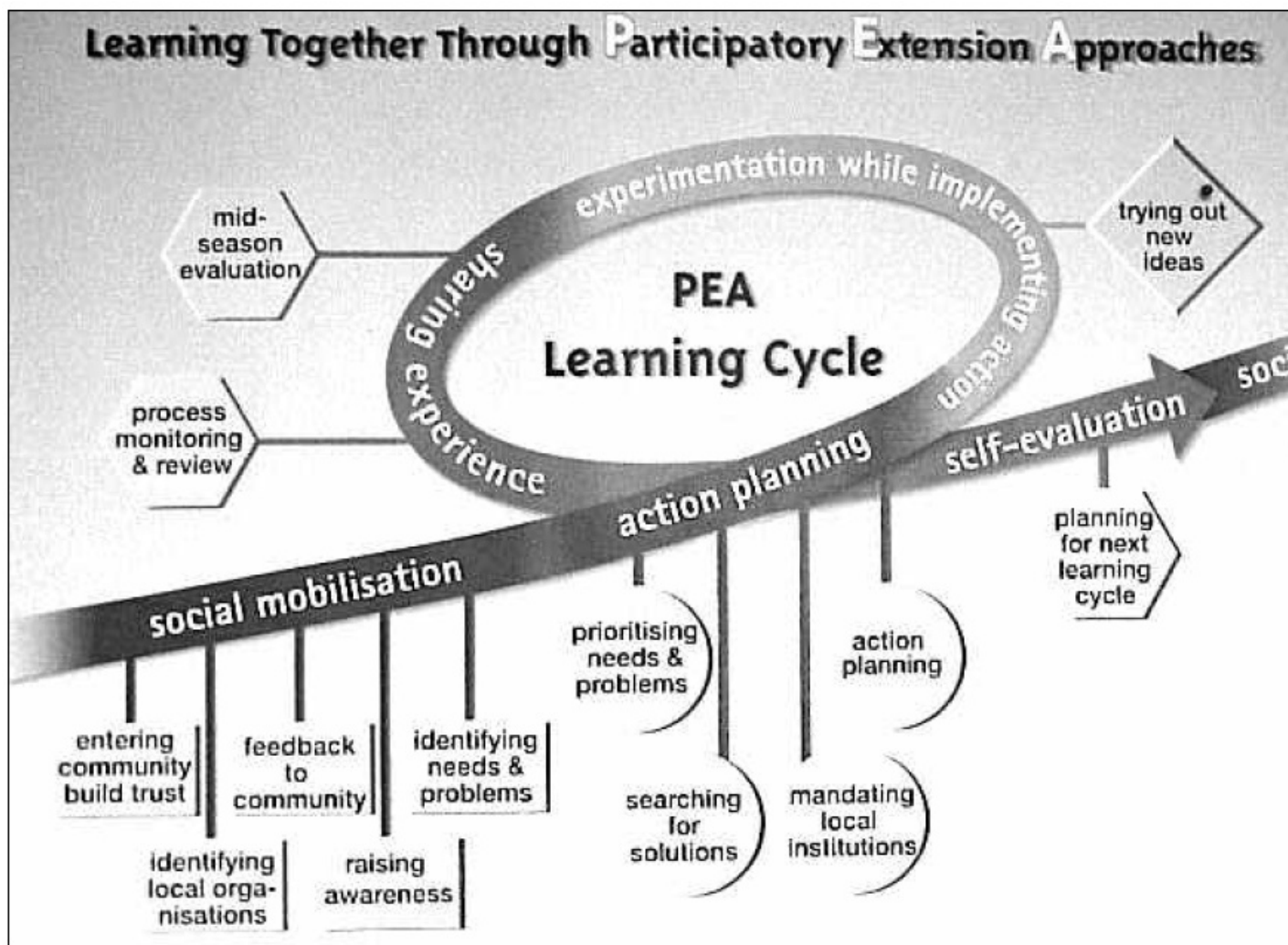
# Implementation of ISFM



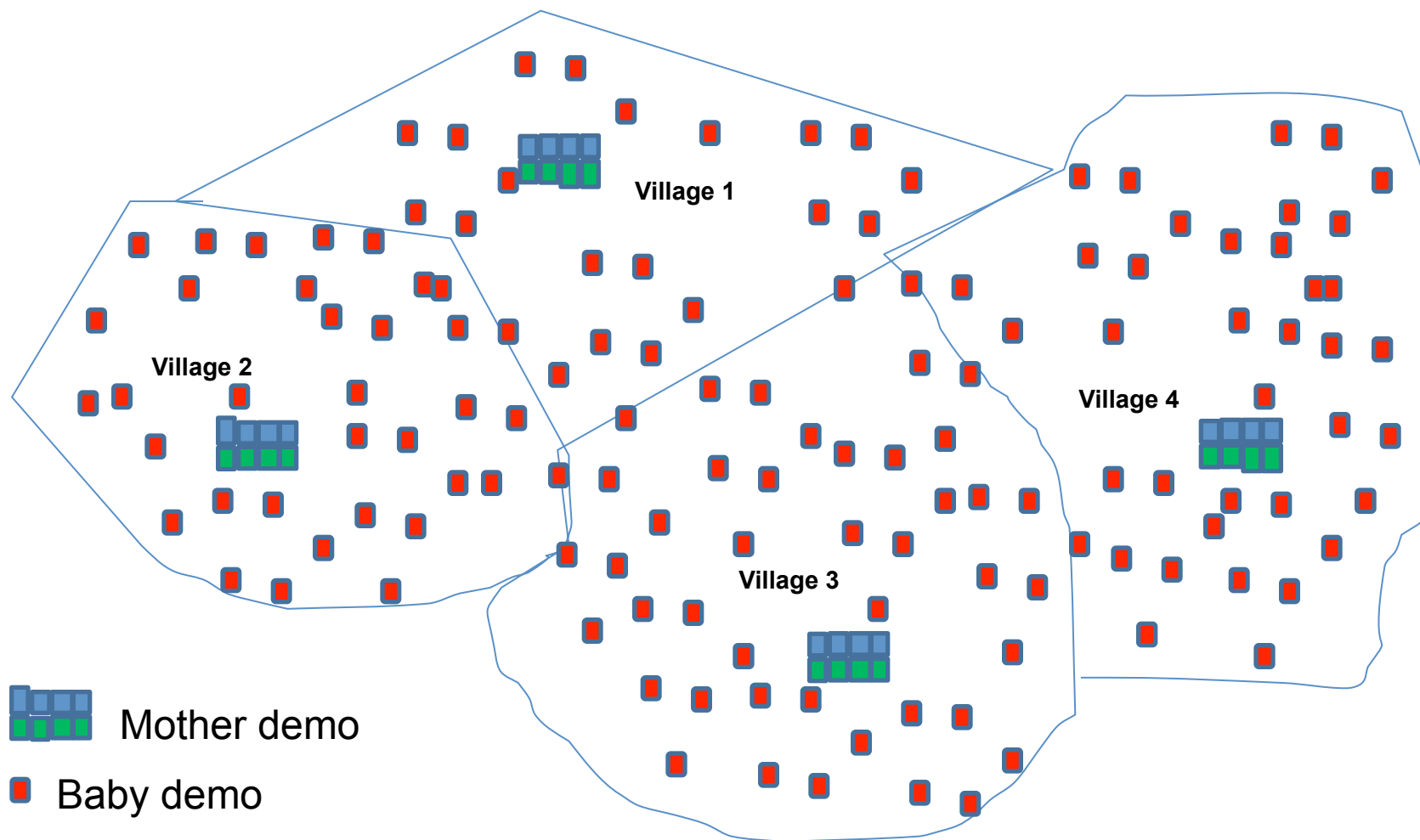
# Key considerations to implement ISFM in Africa (Verchot et al., 2007)

- Understanding of soil fertility problems and management options
- Empowering farmers to scale up research and results.
- Linking advances in ISFM into national soil fertility programs, development planning, and policies.
- Communication with policy makers on the importance of improved research capacity in soil fertility.

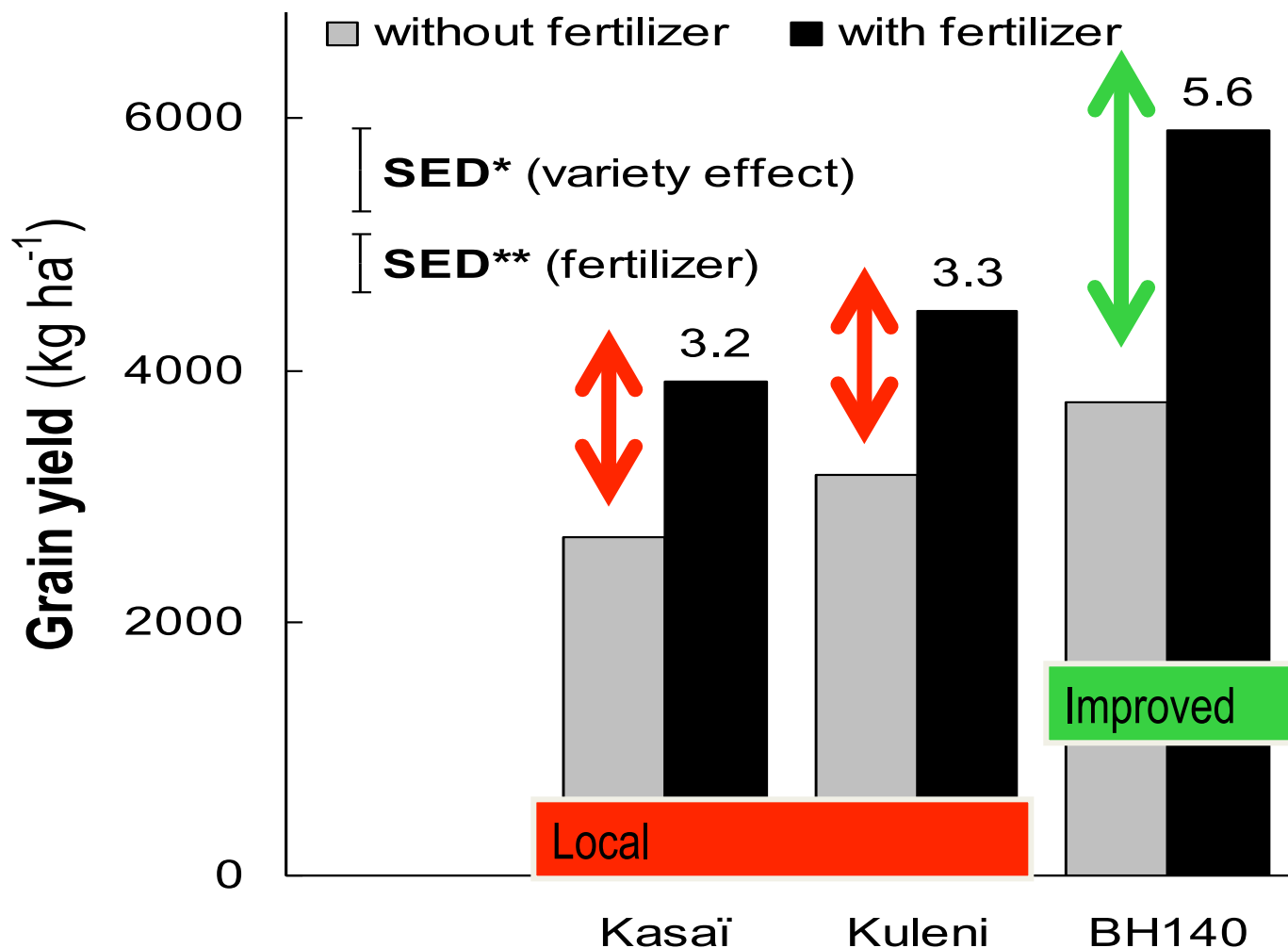
# Knowledge sharing (Ramaru et al. 2000)



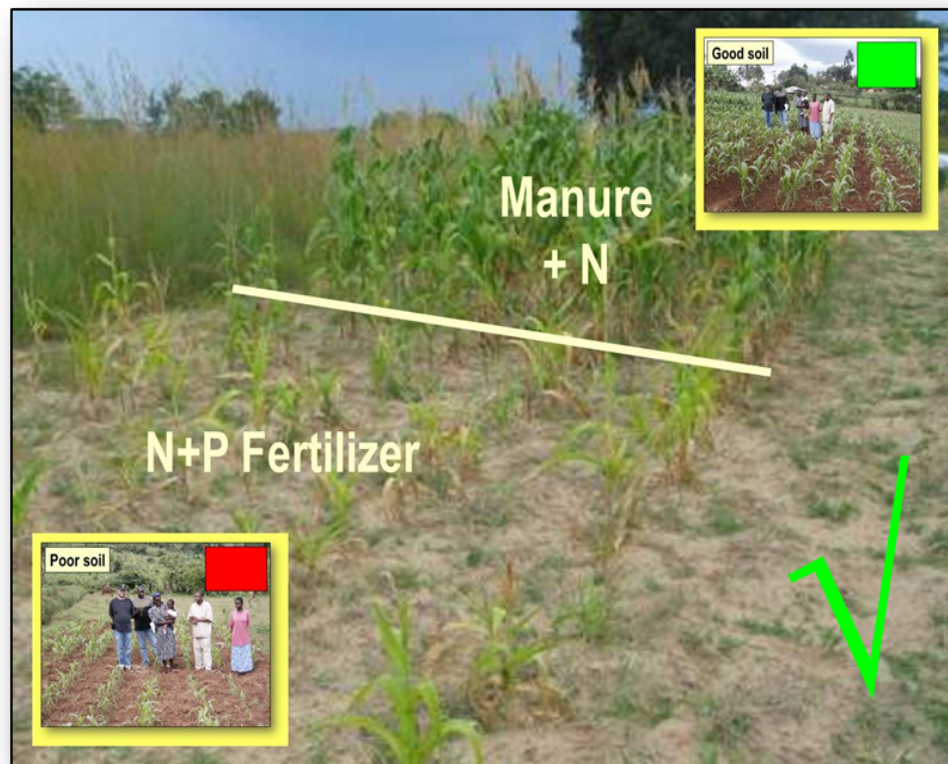
# Knowledge sharing (FIPS)



# ISFM works: maize yield in East DRC!



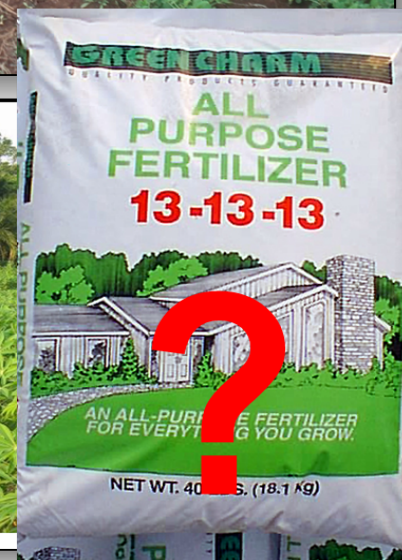
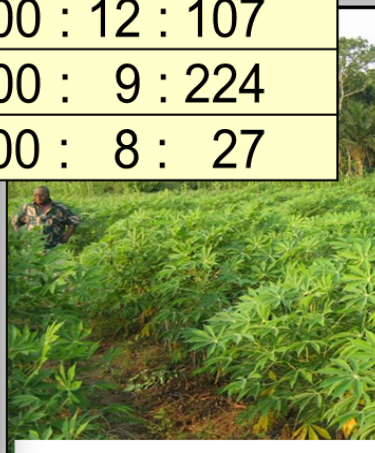
# ISFM works when applied correctly!



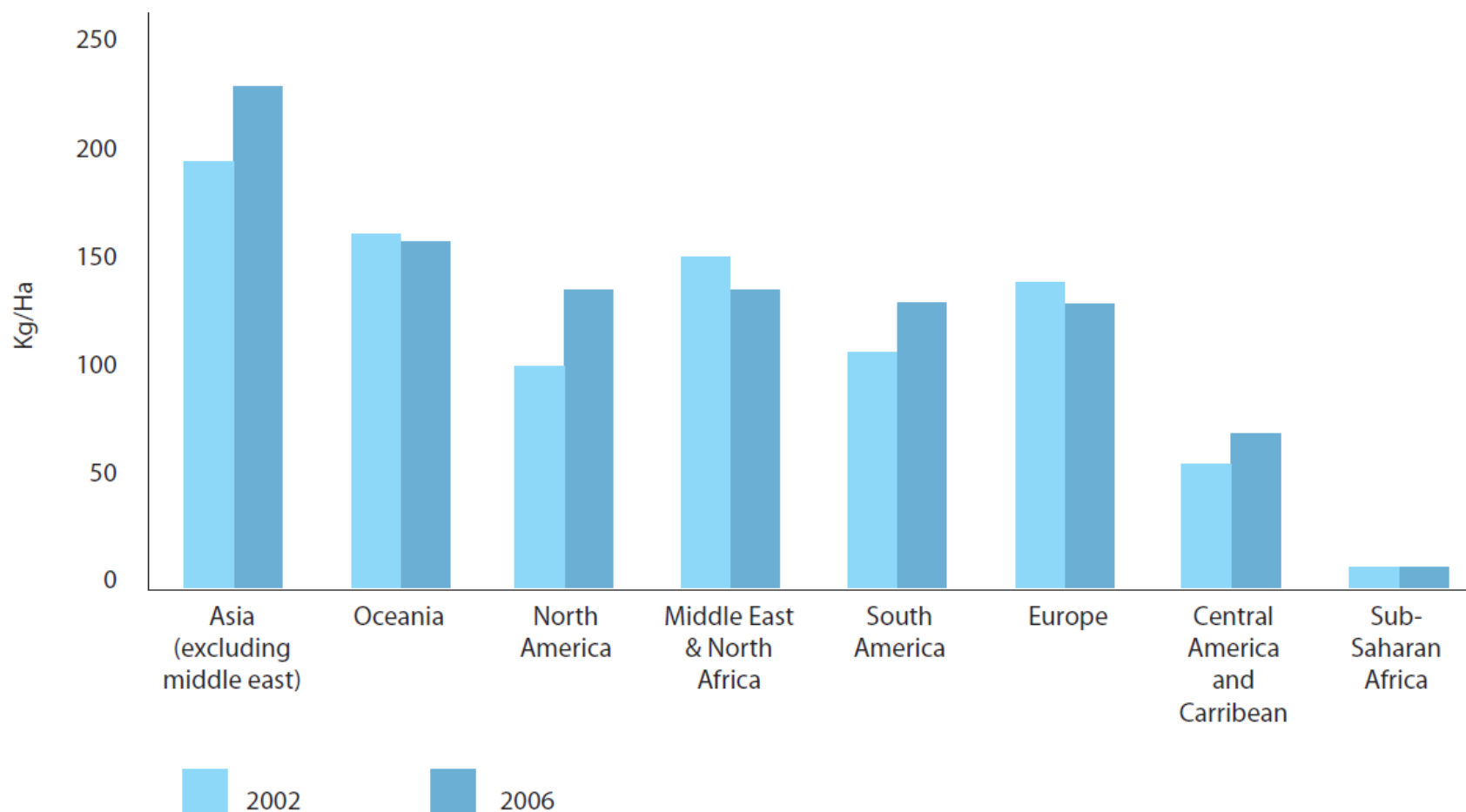
# ISFM works when applied correctly (cont' d)!



Crop	N : P : K ratio
Maize	100 : 21 : 29
Cassava	100 : 17 : 174
Yam	100 : 12 : 107
Plantain	100 : 9 : 224
Soybean	100 : 8 : 27



# Constraints: Fertilizer use in SSA (Detto et al., 2012)



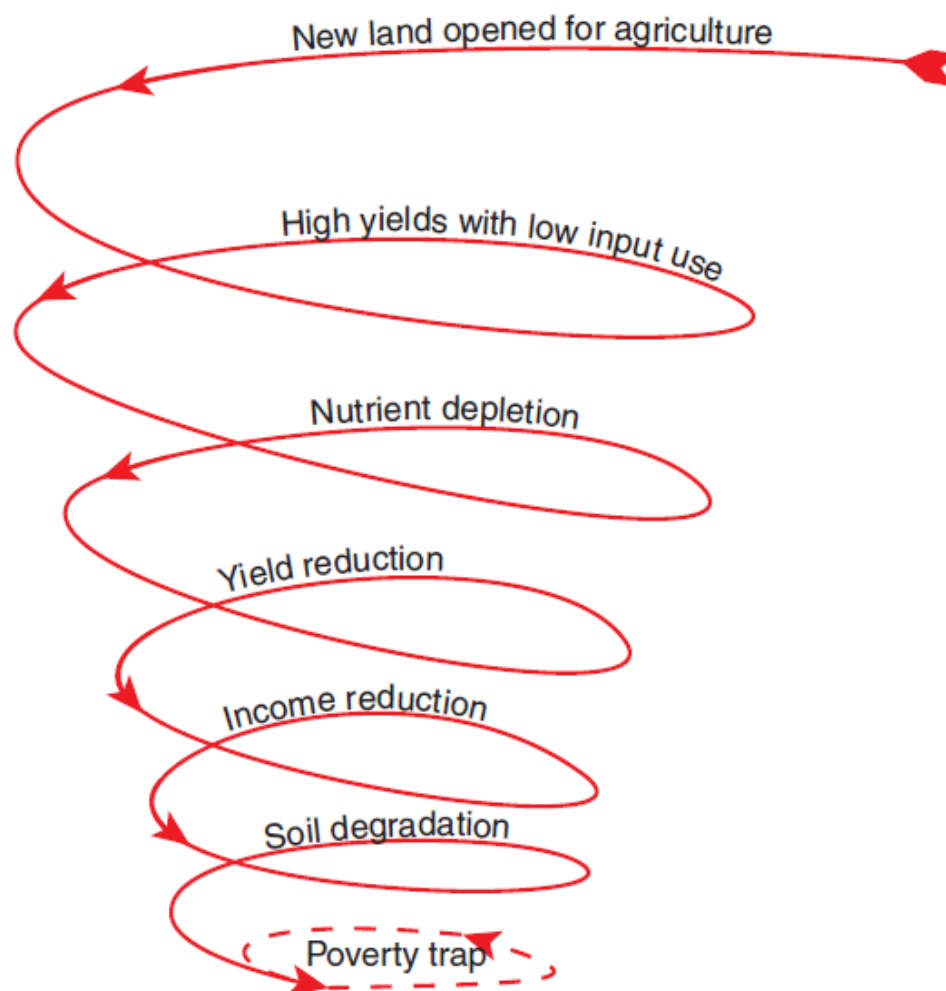
Source: Hernandez & Torero, 2011

# Reasons for never applying chemical fertilizer

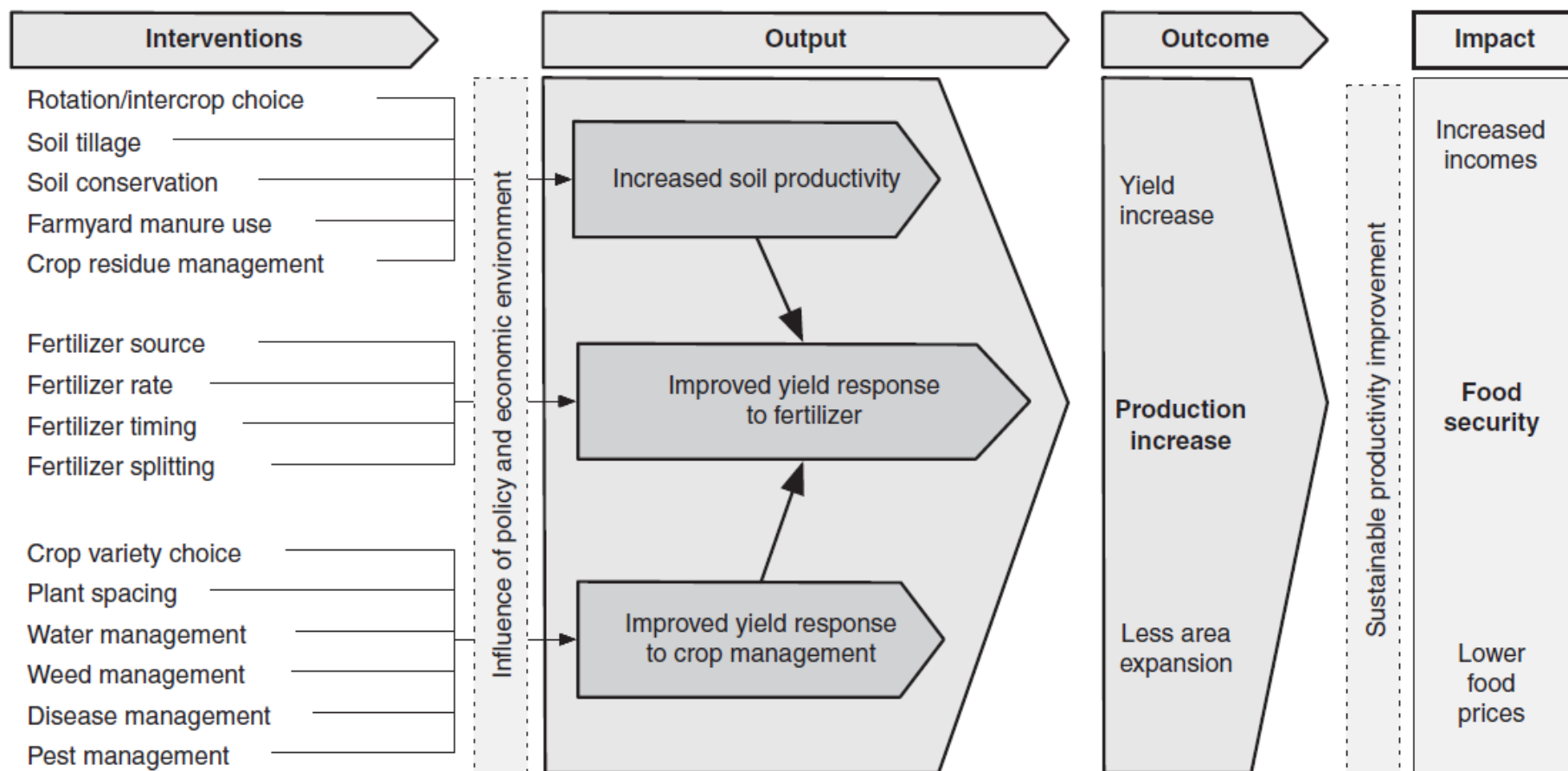
## (n=43) (Minde et al., 2008)

Reason	% of farmers citing reason	Ranking
Fertilizer is too expensive/cannot afford it	90.7	1
Do not know enough about fertilizers	34.9	2
Fertilizer is not available locally	18.6	3
Fertilizer is too risky	9.3	4
User alternative organic fertilizers	7.0	5
Soil is fertile, don't need it	7.0	5

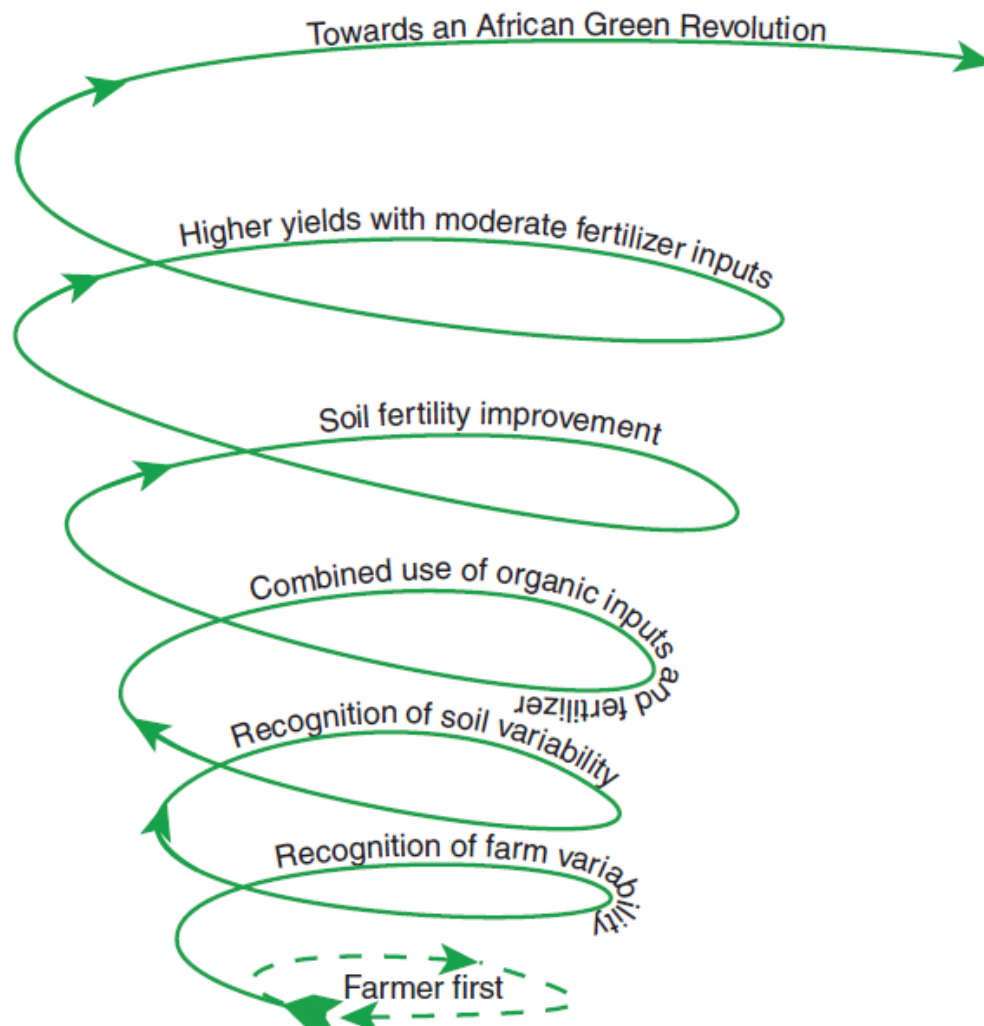
# Soil mining (ASHC., 2012)



# Solution: soil recapitalization (ASHC, 2012)



# Soil recapitalization (ASHC, 2012) (con' t)



# Restoring soil fertility in SSA- Fertilizer negative side-effects (Weight and Kelly, 1998)

- Inappropriate fertilizer use
  - Acidification (in the absence of liming)
  - Loss of SOM (in the absence of organic matter return)

# Restoring soil fertility in SSA- Economic consideration (Weight and Kelly, 1998)

- Issue
  - Smallholder farmers: focus on immediate return to fertilizers
  - Poor agricultural credit systems in SSA
  - Minimum focus on environmental benefits
- Potential solutions
  - Reduced direct and indirect taxes on fertilizer imports
  - Reduced transport costs
  - Promotion of trade and introduction of new cash crops
  - Efficient fertilizer use

# Restoring soil fertility in SSA- technical consideration (Weight and Kelly, 1998)

- Fertilizer use-efficiency
  - Fine-tune recommendation
  - Strengthen the capacity of the extension systems
  - Taking advantage of farmer knowledge to understand the history of their land's soil fertility
  - Economic optimum fertilizer rates

# Restoring soil fertility in SSA- P' s case (Kisinyo et al., 2011)

- Issues
  - Fixation
  - Inherently low P
- Potential solutions
  - Direct use of rock phosphates
  - Organic material with significant level of P
  - Al tolerant and P use-efficient crop varieties
  - Liming
  - Education of farmers and extension agents

# It is possible!



**Millet in Niger**



**Maize in Kenya**

# THANK YOU