Walking in their shoes

The social context of farmers' decision-making

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Photo: Shannon Jensen (2013)

- Good year: Labor constrained
- Bad year: Food insecure

- So why aren't farmers adopting more of the technologies that we KNOW are labor-saving, profitable, climate smart, etc.?

Overview

- Knowledge dissonance
  - Scientists talking with farmers
- Work from western Kenya on local knowledge and communication
  - "Strengthening Folk Ecology" (2001-08)
- Household differentiation
  - Cellphones & Agrarian change (2012-13)
- Modelling & supporting farmers' decisions
  - Work by Pablo Tittonell and others

Cognitive dissonance

- "They don't know what they are talking about"
- A way to convince ourselves new knowledge is not implementable
- Farmers blame researchers for being "out of touch"...
- Researchers blame "lazy" farmers rather than consider our technology might be flawed

Knowledge vs. visibility...

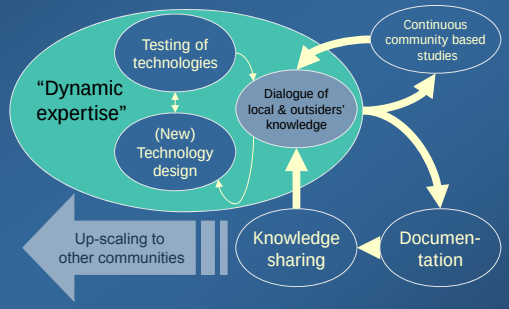
	Not of perceived importance	**Of perceived importance**
Easy to observe (more widely-held, agreed upon knowledge)	**Shallow** knowledge ("trivia")	**Deep knowledge** (Complex, widely-held or consensual knowledges)
Difficult to observe	**Disputed, partial, or "erroneous"** knowledges	**Complex, very variable** (site-specific or contested) knowledges
	"Absent" knowledge(s)?	

Household variability

	Intra-household variation	
	Minimal	Major
Visible	**Crop varieties; Rainfall** (onset, duration, frequency, quantities); **Temperature**	**Crop husbandry** (timing, spacing, weeding); **Pests, weeds & diseases; Manure & household waste management**; **Crop residue management**
Invisible	**Market prices**; **Quality & variability** of purchased inputs	**Labour availability & bottlenecks** (planting, weeding, harvest obligations; out-migration effects); **Intensification & extensification** decisions; **Inter-season and residual effects** (manuring, fertiliser use, burning, land clearance); **Trade-offs for manure & residue use**; **Land tenure security**; **Market access** (inputs, harvest)

Project: Strengthening "Folk Ecology"

- Community-based learning for integrated soil fertility management (2001 - 2008)
  - Dialogue between actors not "knowledges"
  - Farmer groups, NGOs, University Nairobi, an International Research Center (TSBF), Ministry of Agriculture



- Agro-ecological & cultural gradient (Luyia and Teso)
  - High population density (1000+/km^2)
  - Out-migration common (seasonal or semi-permanent)

A standard narrative...

- "BEFORE"... land was **enough**, used **wisely**, food was **plentiful**...
- "THEN"... colonialism brought **new crops**, needed **money** to pay taxes, **sold** labor, youth **moved** to towns...
- ...**population** pressure increased, fallows were **abandoned**, yields declined, soil grew **tired**...
- "TODAY"... we **"struggle to survive"**

Explaining low / declining crop yields

Scientists	Farmers
Low input use / negative nutrient balances	Pests, diseases
Soil structure breakdown	Land is too small
Inappropriate germplasm	Climate has changed
	Soil is "tired"
	Market drives down prices / no money to buy food

(Source: Community discussion, Emuhaya, 2001)

Achieving food security...

Official (GoK) Increase production Maize & inorganic inputs Marketing of cash crops Build local institutions (Terracing, SWC)	**Environmental NGOs** "Best practices" (e.g. organic and/or inorganic inputs, local knowledge) Livelihood diversification
Soil Researchers Nutrient replenishment SWC / Erosion control Organic matter Maize (vegetables?) Market-led investments	**Farmers** Multiple livelihoods, education Respond to markets (Knowledge & assets downplayed)

(Source: Synthesis of interviews and documents, 2001-04)

Soil degradation among many problems...

Health

Declining land holdings per capita

Weeds, pests, diseases

Imperfect markets

Under-employment

The myth of "community"

- Gendered differences in interests & needs
- Greater difference in farm size **within** villages than **between** them
- Subsistence vs. market orientation
- Knowledge generation and sharing vs. withholding

Knowledge & practices

a) Local logic of basic practices
b) Beyond "ethno-pedology"
c) Household & knowledge differentiation

a) "Common sense" of local logics

- Compost preparation or waste collection
- Home garden creation / management
- Necessity of planting staple crops even on poor lands

a) They tell us "everything you do is wrong"

- Farmers see their existing practices constantly criticized, under-valued
  - Slash-and-burn
  - Local varieties vs. hybrid maize (vs. sorghum / millet)
  - Broadcast vs. row planting
  - Farmyard manure vs. inorganics

b) Beyond "ethno-pedology"

- From local names → concepts of soil origin, changes, fertility maintenance
- Indicators of soil quality status, change (local & technical)

b) Local concepts of soil and land

- Soil (*elilova*) and land (*eligunda*)
  - Fertility like tasty, fatty meat (*obunulu*)
  - Vs. *Omugumba* (barren-ness)

- Indicators of soil **fertility** but also of how "good" a **season** this will be (i.e.: will investments in soil be worthwhile?)
  - Strong incentives to plant every season regardless of low fertility

b) Pests / diseases > fertility?

- *Striga* endemic
- Nematodes
- Stem borers & cut worms
- Wilts
- Mosaic virus
- Root rots
- (Agroforestry species as "weeds")

b) Different perceptions of crops

E.g. Cassava:

- "Increases fertility"
- "Suppresses weeds"
- "Acts as a fallow"
- "Manufactures its own food, doesn't compete"

b) Different perceptions of crops

E.g. Common beans:

- "Companion" to maize (or other cereal)
- Spreads risk over season
- Leaves burnt to make local salts
- "Manufactures its own food, doesn't compete"

Domesticating each other?

c) Household differentiation

- Extreme socio-economic variation within and between communities (Jayne et al 2003)
  - ~25% households virtually landless (<0.10 ha per capita)
  - Largest variation in land per capita is **within-village not between villages**
- Growing role for non-farm income (40%)
  - Massive rural under-employment
  - Long history of out-migration

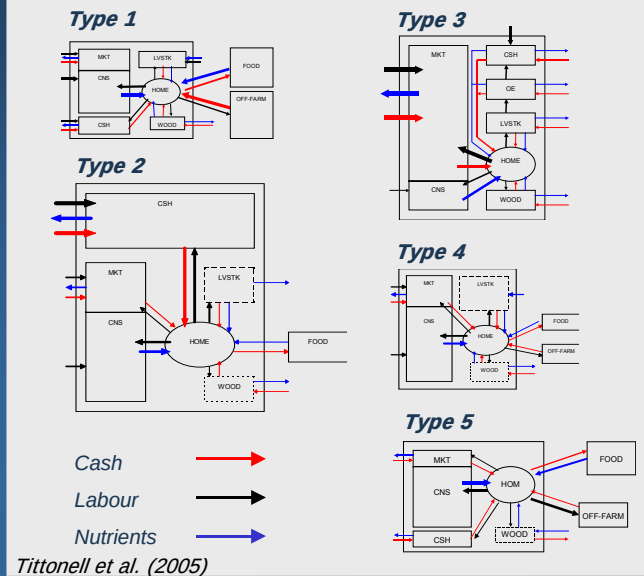
Multi-locational households?

- Increased linkages between rural homes and migrants (cellphone)
  - More Kenyans have access to cellphones (72%) than to clean water (65%) or electricity (34%)
- Phones & transport transforming household structures (Ramisch, 2014)
  - 52% remit money 1-2x / month
  - 46% spoke 1-2x / week
  - Fewer returns home (once every **377** days in 2013 vs. **117** in 1986)

Knowledge & livelihood impacts

- More than ever, migrants think they are involved in rural home
  - Greater demands on rural family, constraining women's limited autonomy?
  - Only hearing about "crises", less continuity in observing environmental changes
- Impacts vary with wealth & knowledge
  - "Stepping up" or "stepping out" for better resourced households
  - Just coping "hanging in" for less well off (Dorward et al., 2004)

c) Not all "farmers" are farming

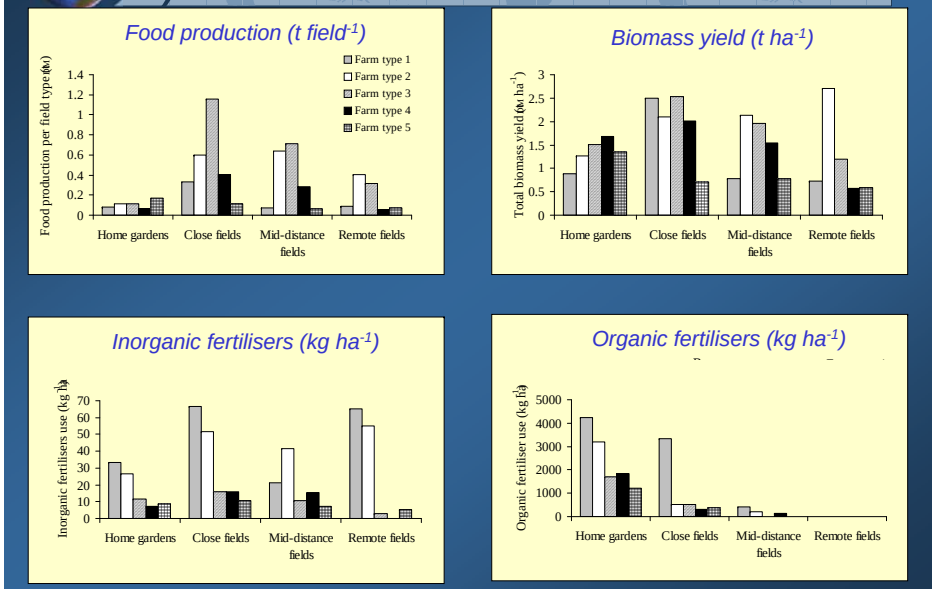


Tittonell et al. (2005)

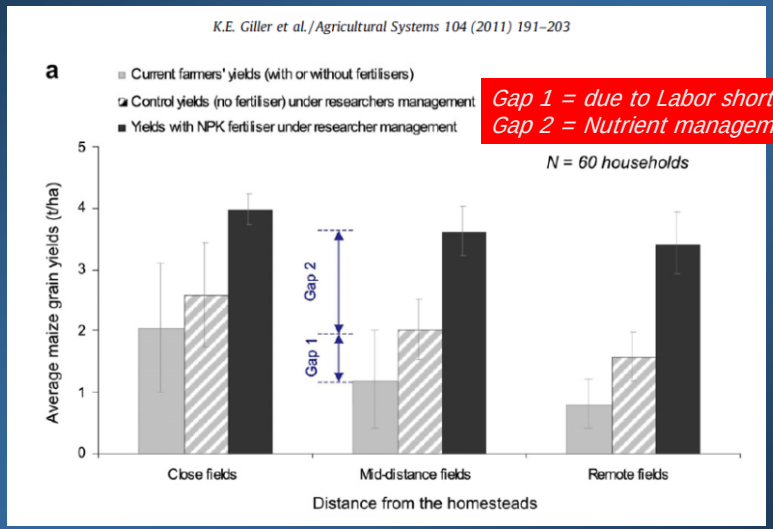
c) Typology attributes

Type	Wealth	Production	Constraints	Household	Income
1	Mainly high, some medium	Self-subsistence	Land (labour)	Small	Salary, pension
2	High	Market-oriented	(Labour)	Old, big	Cash crops & farm
3	Medium	Self-subs. & some market	Capital, some labour	Young, small	Farm, other enterprises
4	Mainly low, some medium	Self-subsistence	Land, capital	Young-mid	Services
5	Low	Self-subsistence	Land, capital, labour	Big, many ♀-head	Selling labour

c) Practices and outcomes



c) Practices → soil variability



Beyond economic models

- Rational choice models downplay social factors and "overall" utility
- Market failures (de Janvry et al 1991)
  - Won't sell in a market if the costs of participation exceed its possible benefits
- People may be price responsive but in many cases no market or no price exists
  - Poor infrastructure, lack of information, transaction costs

Nested contexts of decision-making

- Each level of opportunity includes new sets of constraints to negotiate...

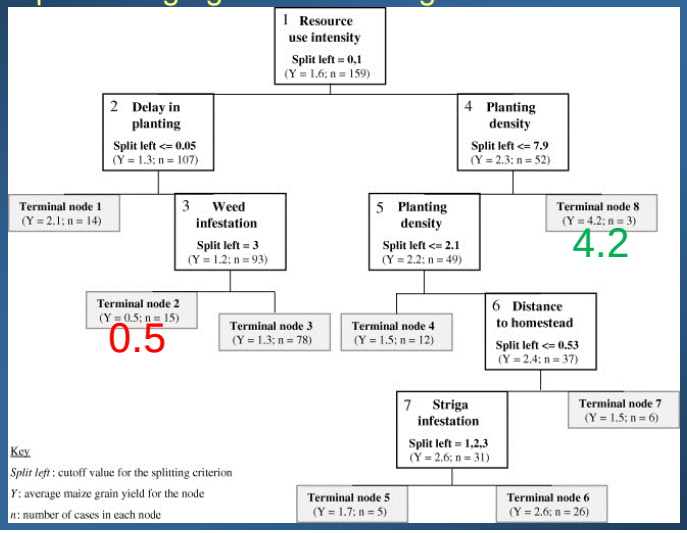
Household management
Livelihood options (on/off-farm; subsistence vs. commercial, etc.)
Labor allocation (gender, age)
Investments (education, farm, business, other capital, etc.)

Farm management
Cropping & labor allocation, **land-use** decisions (short /long-term including adding / dropping plots)

Crop husbandry
Variety, planting dates, inputs, weeding, pest management, harvest...

Classification & regression tree (CART)

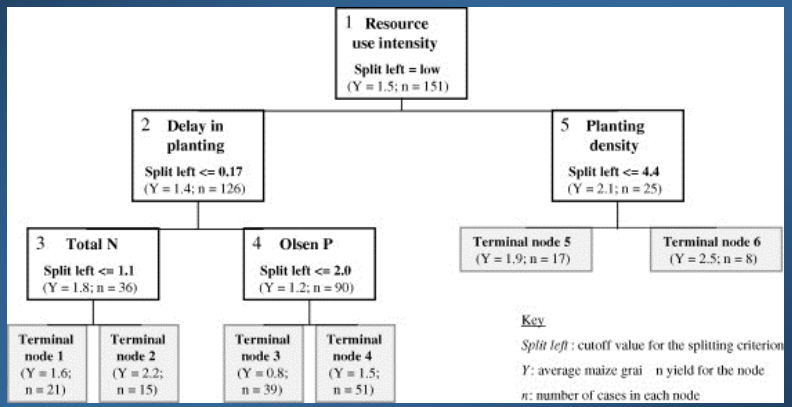
- E.g. Maize grain yield variability as a function of variables representing agronomic management decisions



Tittonell et al. (2008 Fig. 5)

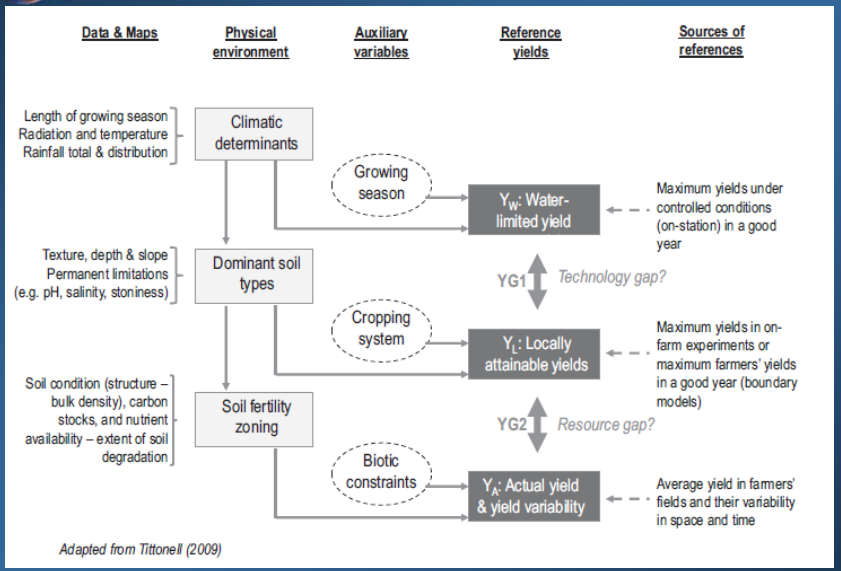
Classification & regression tree (CART)

- E.g. Maize grain yield variability = f(agronomic management decisions AND environmental variables)



Tittonell et al. (2008 Fig. 6)

Constraints: biotic/abiotic, social

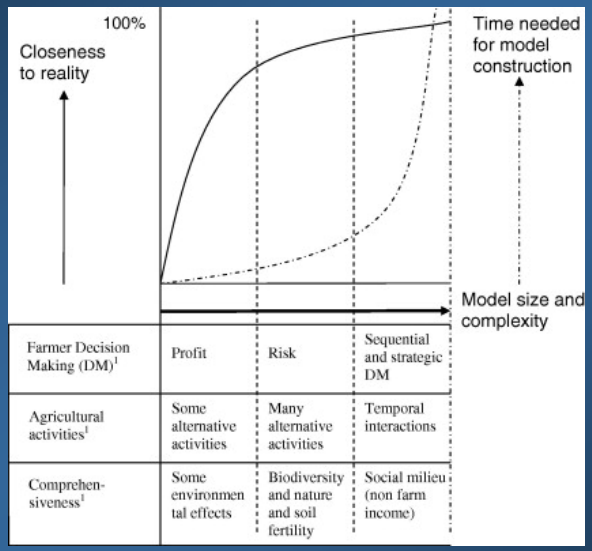


Targeting socio-ecological niches

Fertility status	NPK responsive?	Recommendation
High	No	Maintenance fertilization only
Intermediate	Yes	Many options: targeted fertilizer, cereal-legume rotations, etc.
Low	No	Restoration & rehabilitation

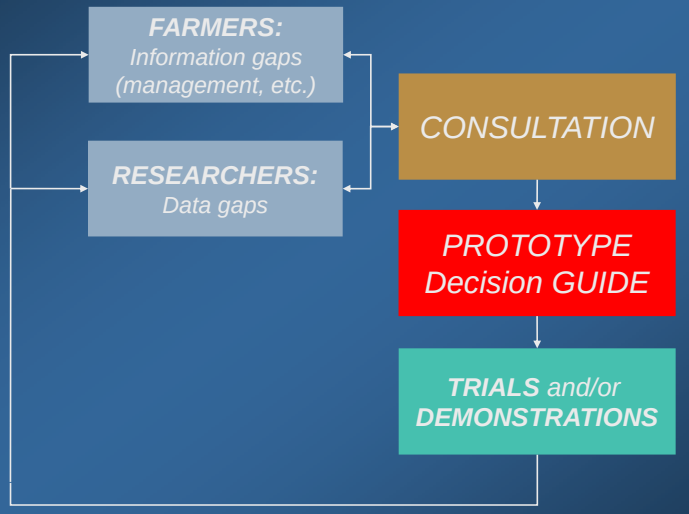
- Farmers often know how to manage limited resources well... but need help knowing how to deal with new opportunities
  - E.g. Fertiliser subsidy in Malawi ↑ production but N use efficiency only +14 kg grain / kg N
- Recommendations = "best fits" for each socio-ecological niche (Ojiem 2006)

Modelling, time & the real world



Janssen & van Ittersum (2007: Fig. 3)

Iterative design process



Thinking to higher scales?

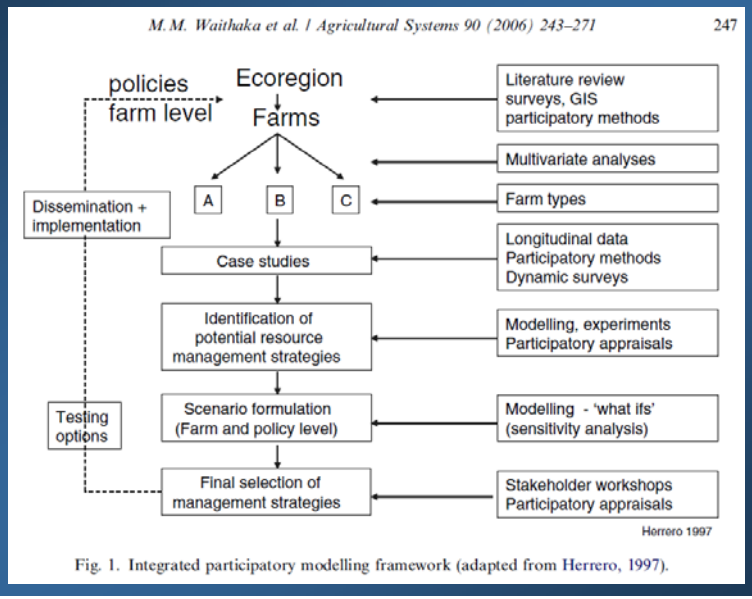
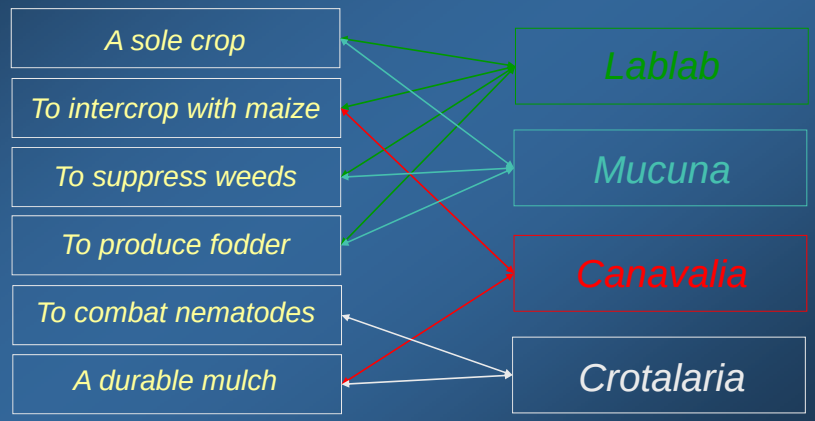


Fig. 1. Integrated participatory modelling framework (adapted from Herrero, 1997).

Decision guide #1:

Choosing green manure species

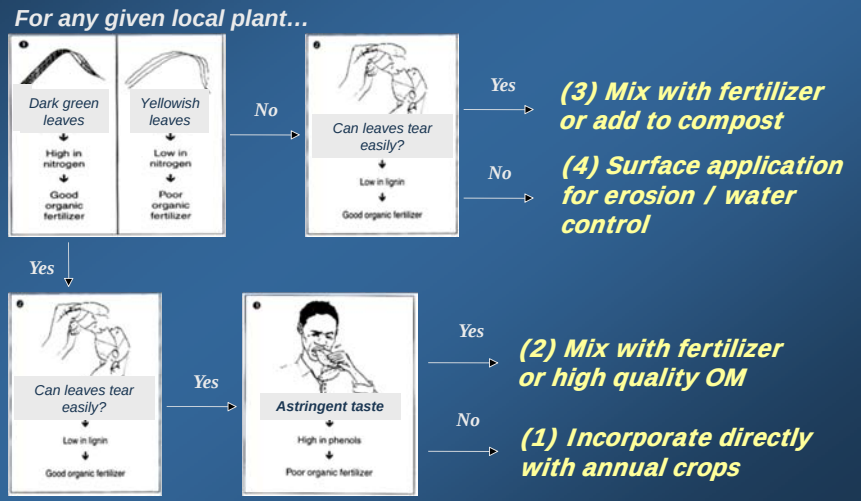


Critique of guide #1

- Open-ended, good tool for discussing the relative benefits / costs of different green manures
- Effectively needs four follow-up guides for each species, its management, potential problems, etc.
- List of attributes may not reflect major preoccupations of farmers
  - (i.e.: developed by researchers using observations of each species)
- Decisions to leave land fallow may be accidental (out of time, labour, money, etc.) not planned

Decision guide #2:

Resource quality (biomass transfer)

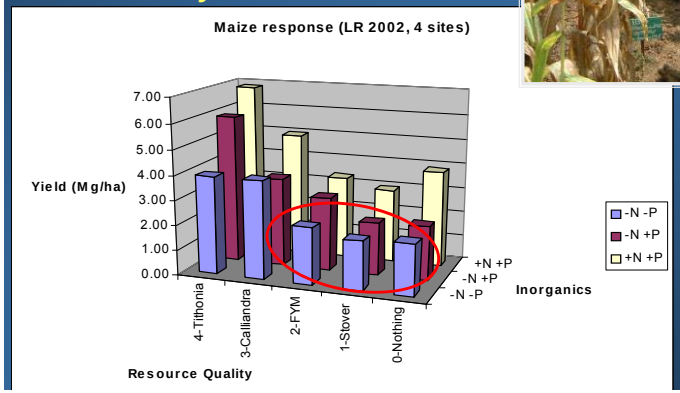


Critique of guide #2

- Highly functional, based on process research
- Quickly identifies whether a given, unknown organic resource is HIGH or LOW quality
- Needs more detail on application rates (alone or combining with inorganics), residual effects, etc.
- Inappropriate if farmers do not consider "quality" and are applying "all organic matter available"
- Frequently reduces to two branches:
  1. Apply all available HIGH quality on its own
  2. Apply all available LOW quality with fertilizer

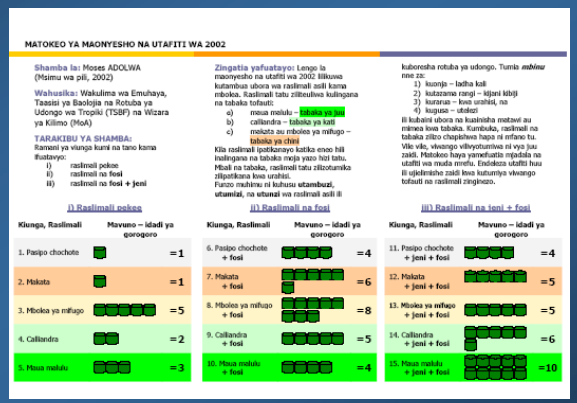
Farmer experiments using Guide #2

- Maize-bean response to organic resource quality & crop nutrition
- Monitoring and evaluation, Field days



Documentation of results

- True learning needs commitment to sharing research results, feeding back to integrated knowledge



MATOKEO YA MAONYESHO NA UTAFITI WA 2002

Shamba la: Moses ADOLWA (Msimu wa pili, 2002)

Wahusika: Wakulima wa Emuhaya, Taasisi ya Baolojia na Rotuba ya Udongo wa Tropiki (TSBF) na Wizara ya Kilimo (MoA)

TARAKIBU YA SHAMBA:
Ramani ya viunga kumi na tano kama ifuatavyo:
i) raslimali pekee
ii) raslimali na **fosi**
iii) raslimali na **fosi + jeni**

Zingatia yafuatayo: Lengo la maonyesho na utafiti wa 2002 lilikuwa kutambua ubora wa raslimali asili kama mbolea. Raslimali tatu zilibeuliwa kulinganа na tabaka tofauti:
a) mesa meluku – tabaka ya juu
b) calliandra – tabaka ya kati
c) mekata au mbolea ya mifugo – tabaka ya chini
Kila raslimali ipatikanayo katika eneo hili inalinganа na tabaka moja yazo hizi tatu. Mbali na tabaka, raslimali tatu zilizotumika zilipatikana kwa urahisi.
Funzo muhimu ni kuhusu **utambuzi, utumiaji**, na **utunzi** wa raslimali asili ili kuboresha rotuba ya udongo. Tumia *mbinu* nne za:
1) kuunja – ladha kali
2) kutazama rangi – kijani kibiji
3) kurarua – kwa urahisi, na
4) kuguza – ulaikezi
ili kubaini ubora na kuainisha matawi au mimea kwa tabaka. Kumbuka, raslimali na tabaka zilizo chapishwa hapa ni mfano tu. Wale wale, viwango vilivyotumiwa ni vya juu zaidi. Matokeo haya yanaelaatia mipaka na utafiti wa muda mrefu. Endeleza utafiti huu ili ujielimishe zaidi kwa kutumiya viwango tofauti na raslimali zingineo.

i) Raslimali pekee

Kiunga, Raslimali	Mavuno – idadi ya gorogoro	
1. Pasipo chochote		=1
2. Makata		=1
3. Mbolea ya mifugo		=5
4. Calliandra		=2
5. Mesa meluku		=3

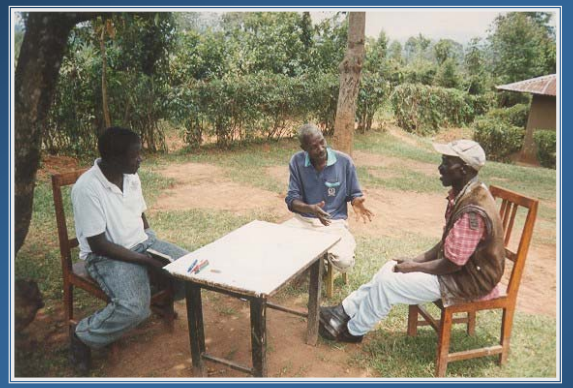
ii) Raslimali na fosi

Kiunga, Raslimali	Mavuno – idadi ya gorogoro	
6. Pasipo chochote + fosi		=4
7. Makata + fosi		=6
8. Mbolea ya mifugo + fosi		=8
9. Calliandra + fosi		=5
10. Mesa meluku + fosi		=4

iii) Raslimali na jeni + fosi

Kiunga, Raslimali	Mavuno – idadi ya gorogoro	
11. Pasipo chochote + jeni + fosi		=4
12. Makata + jeni + fosi		=5
13. Mbolea ya mifugo + jeni + fosi		=5
14. Calliandra + jeni + fosi		=6
15. Mesa meluku + jeni + fosi		=10

Feedback and validation



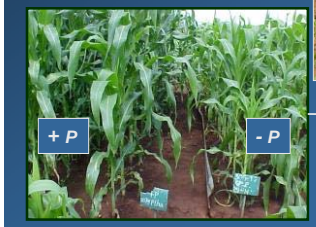
- Find out whether Guides improved practice
- Often, farmers already know best practices but are limited by socio-economic situation
- Identify next steps for research & farmers

Guides: Conclusions

- Involve farmers in guide design and testing, not just the approval of finished products.
- Decisions steps must:
  - Reflect **real questions** that farmers would ask themselves about the technology and its management
  - Use resources that are **available**, and adoptable
- Initial guides:
  - Over-estimated resource availability (especially organic matter and labour)
  - Under-estimated local existing knowledge

Evolution of farmers' experiments

*Identify **other** high quality organic materials locally*



*Response of **maize-beans** to organic resource quality and inorganic inputs (N + P)*

*Response of **local vegetables** to organic resource quality and inorganic inputs (N + P)*

*Experiment with **cereal-legume rotations** to improve soil fertility*

Experimental styles

Characteristic	Conventional, researcher-managed trial	Jointly-managed 'demonstration trial'	Individual project experiment	Typical western Kenyan individual experiment
# treatments	Few	Many	Few	Few
Randomized	Yes	No	No	No
Plot husbandry	Row planting	Row planting	Row or broadcast planting	Row or broadcast planting
Plot basal spraying or fertilization	Yes (to isolate confounding factors)	No (except to control major pest or weed problems)	No (would be considered a treatment)	No
Replication	Essential	No	No	No
Numbers (Quantification)	Yes (essential for statistical analysis)	Visual analysis + quantification	Visual analysis with few numbers	Visual analysis with few numbers
Control plots	Yes	Yes	No (baseline 'known')	No (baseline 'known')
Who is it for?	1. Research team 2. Scientific community	1. Local community 2. Research team	1. That household 2. Local community	1. That household only
Serendipity	Confounding factors isolated & controlled	Confounding factors monitored & explained	Confounding factors monitored & explained	Confounding factors monitored & explained
Conclusions from…	Specific data measurements	Specific data measurements, observation & comparisons	Observation, memory & comparisons	Observation, memory & comparisons

Networks and knowledge

- Community-based learning:
  - Knowledge "gaps" identified collectively
  - "Building trust" vs. staff / farmer turnover
  - Farmers wanted information > innovation, to discuss the technologies with peers
- Implications for knowledge transfer
  - **In**-groups ("we are 'good' farmers") vs. **out**-groups
  - Shared resources improve knowledge use & buffer risks to poorest? (or not? - gender implications)


Thank you
Merci
Gracias
Asante
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