



# The contribution of Africa RISING research to development outcomes

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## Objectives

- Identify and evaluate demand-driven options for sustainable intensification
- Create opportunities for smallholder farm households to move out of poverty and improve their nutritional status
- Facilitate partner-led dissemination of integrated innovations beyond Africa RISING action research sites





# Research consortium: theory of change

Improved inputs

Productive, resilient,  
locally adapted crop  
varieties, fodders, livestock

Production support inputs

(Fertilizers  
Pesticides, Feeds,  
Equipment, Labor,  
Services, etc.)

Efficient throughput  
(Integration of technologies)



Increased outputs

Increased production and  
productivity

Increased availability of nutritious  
food

Resilient and productive cropping  
systems

Knowledge for production,  
processing and marketing

Social capital and gender equity

External factors: markets, institutions, gender, policy, etc.



# Deploying new crop varieties



# New drought tolerant, early maturing and high yielding crop varieties

- Abiotic stresses
  - Erratic rains and poor distribution
  - Heat
  - Low soil fertility
- Biotic stresses
  - Pests and diseases (emergent- Maize lethal necrosis)
- Nutrition
  - Quality protein maize
  - Mineral and Vitamin A enriched varieties





# Crops under evaluation trials



**Sorghum**



**Pearl Millet-**

**MAIZE VARIETY  
DESCRIPTION**  
by Peter Setirele, Mwansa Kobamba, Ludasi Sing'oro,  
Mikind Mawoko, Francisco Mui, Doreen Mulele



**Groundnut**



**Pigeonpea**



## Crops under adaptability and evaluation trials



Orange fleshed sweet potato - Zambia



Climbing beans - Malawi



Common beans - Tanzania



# Enhancing resilience of cereal systems



# Introducing Legumes: Benefits



BNF



Income,  
Nutrition

Organic Residue



0-20 cm

Belowground C sequestration, infiltration



20-40 cm



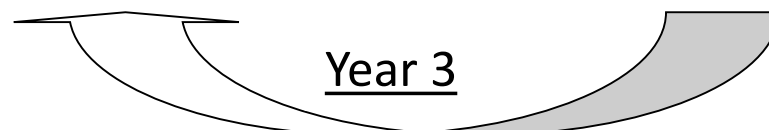
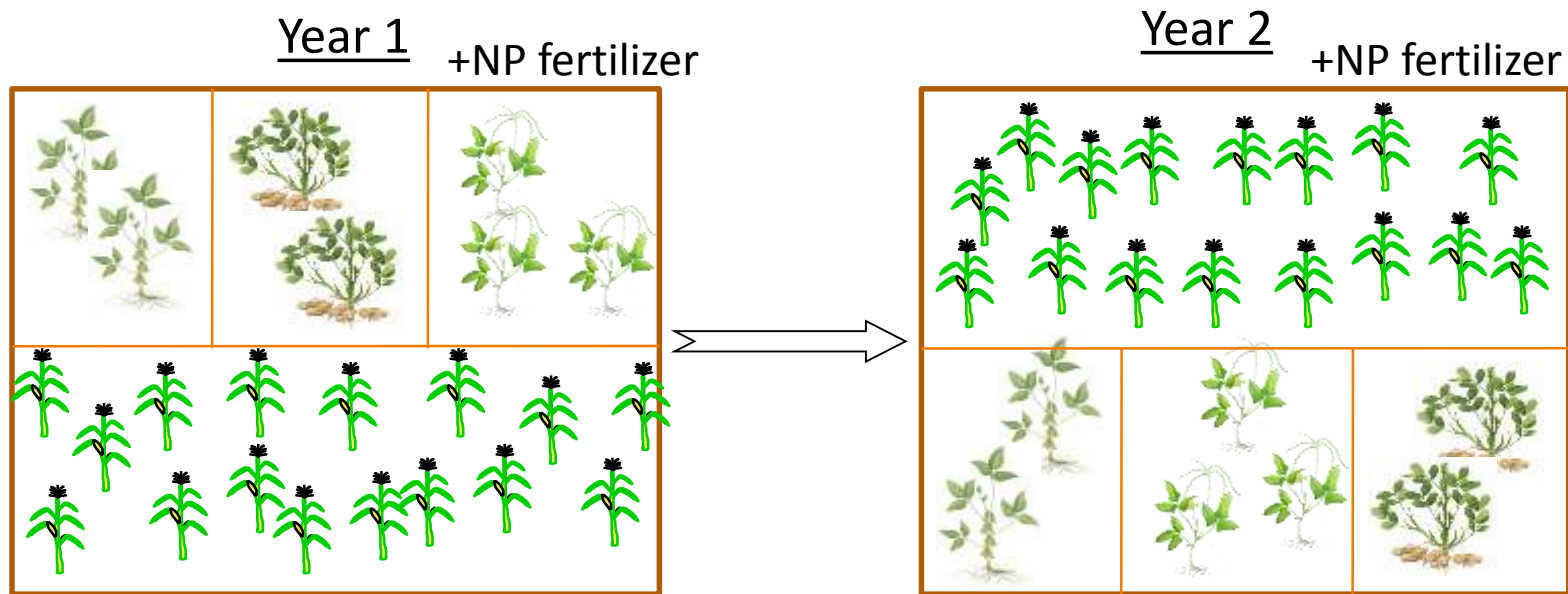
40-60 cm



Stabilising erosion bunds



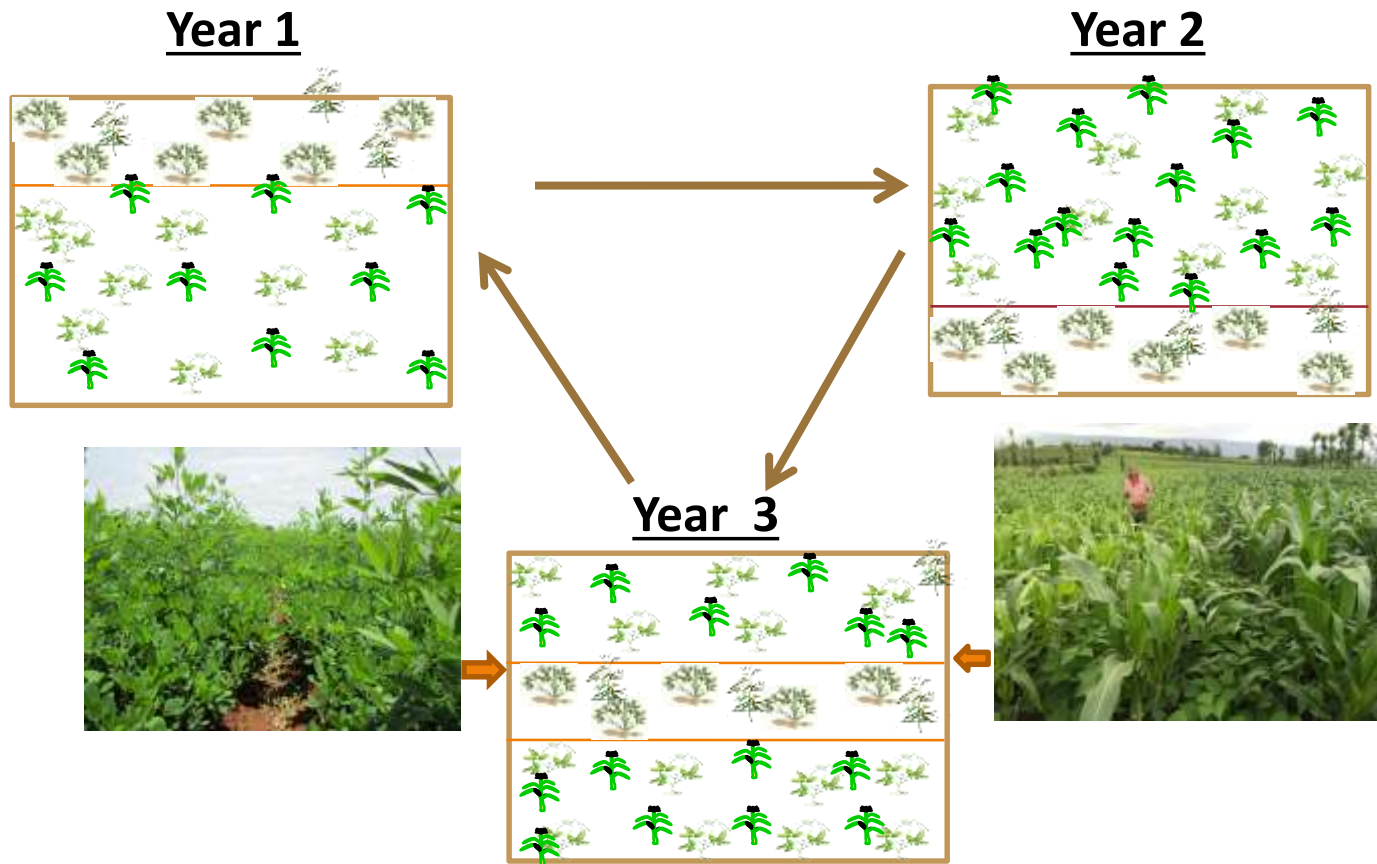
## Targeting cereal/legume system: Rotation for large land parcels



**Reduced NP fertilizer  
on sequenced maize**



# Targeting cereal/legume system: **Rotation & intercropping** for small land parcels





# Land management



# Application of fertilizers

## Challenges: Babati example

- Maize yield gap at farm level = 7.4T/ha
- Field with net nutrient negative balances = 52%
- Farmers applying fertilisers = 3.3%
- Myth = fertilisers poison the soil

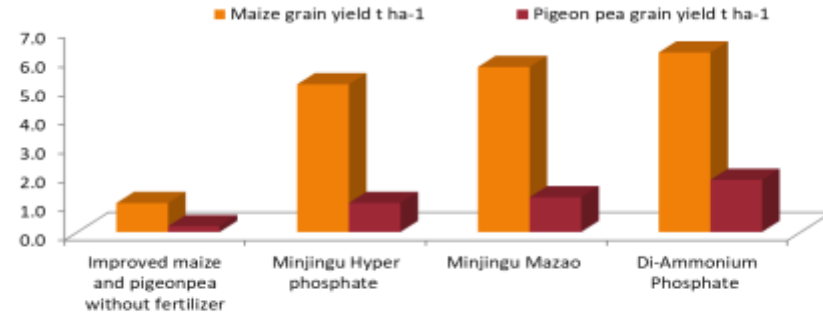


# Land management: Fertilizer use

## Yield Response



Application methods (4Rs)



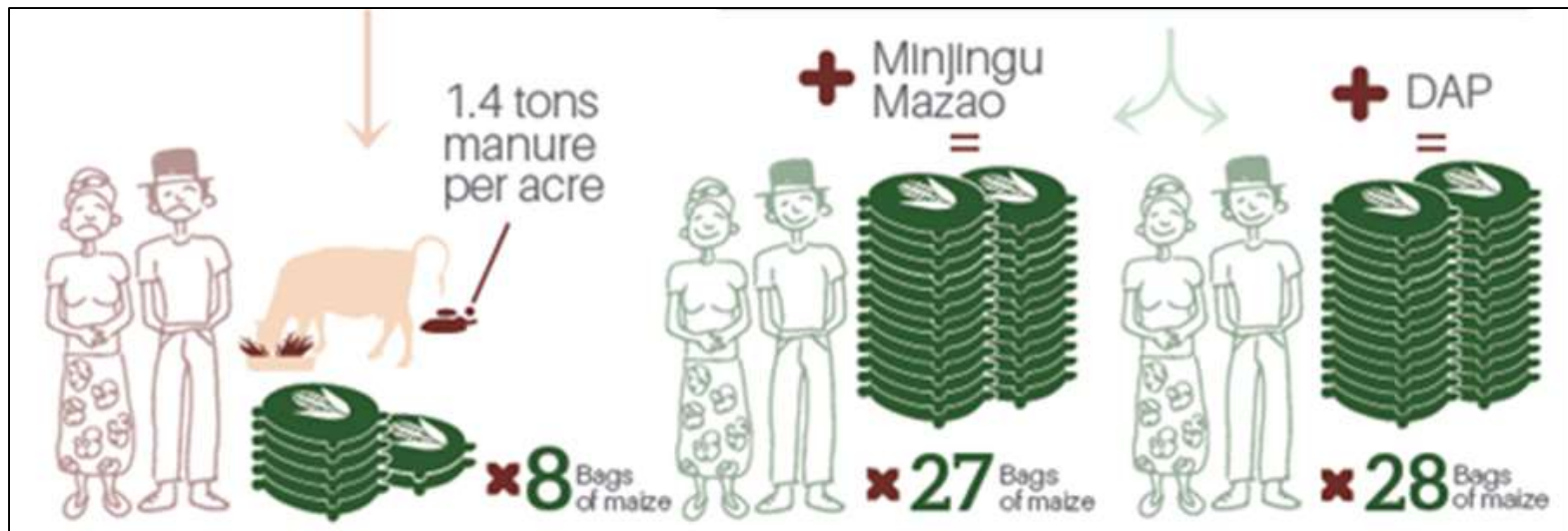
Phosphorus fertilizer source - 2014

## Economic benefits

Treatment	Net income ( USD)	Total variable cost ( USD)	Benefit cost ratio
Improved maize and pigeonpea without fertilizer	359	458	0.8
Minjingu Hyper phosphate (granular) 20 kg P ha <sup>-1</sup>	1141	780	1.5
Minjingu Mazao 20 kg P ha <sup>-1</sup>	1600	873	1.8
Di-Ammonium Phosphate (DAP) 20 kg P ha <sup>-1</sup>	2218	1052	2.1



# Fertilizer use pictorial for farmers



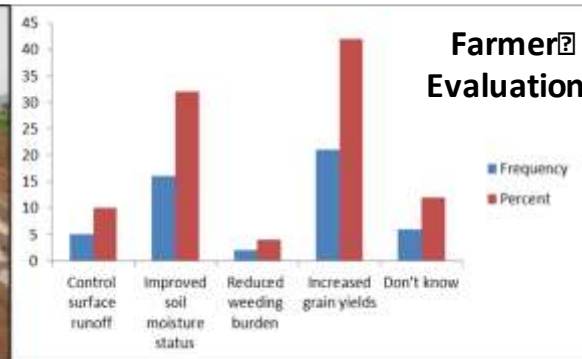
# Land management: Tillage methods

Overgrazing; Land degradation



Tillage methods on maize grain yield

Tillage method	Yield (kg/ha)
Conventional box-plough	1203
Ox-ripping tillage	2235
Ox-ridging tillage	3117



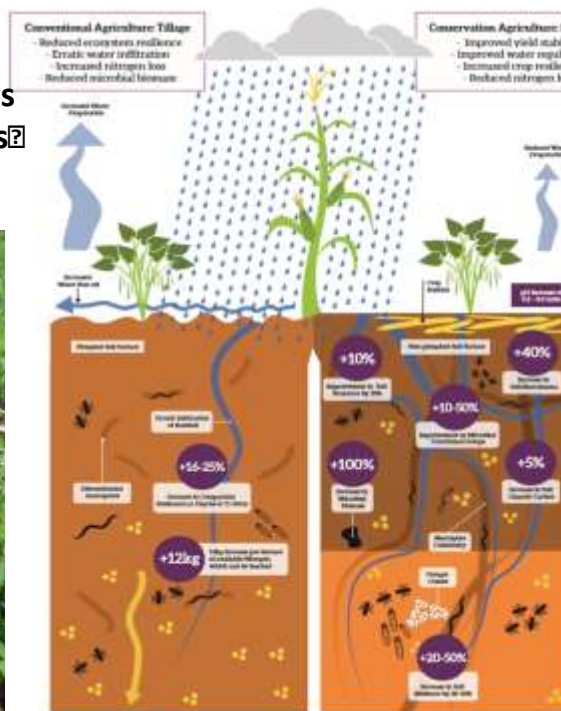




# Land management: Conservation Agriculture

## CA Principles:

1. Minimal soil movement
2. Surface crop residue retention
3. Diversification through rotations and intercropping with legumes

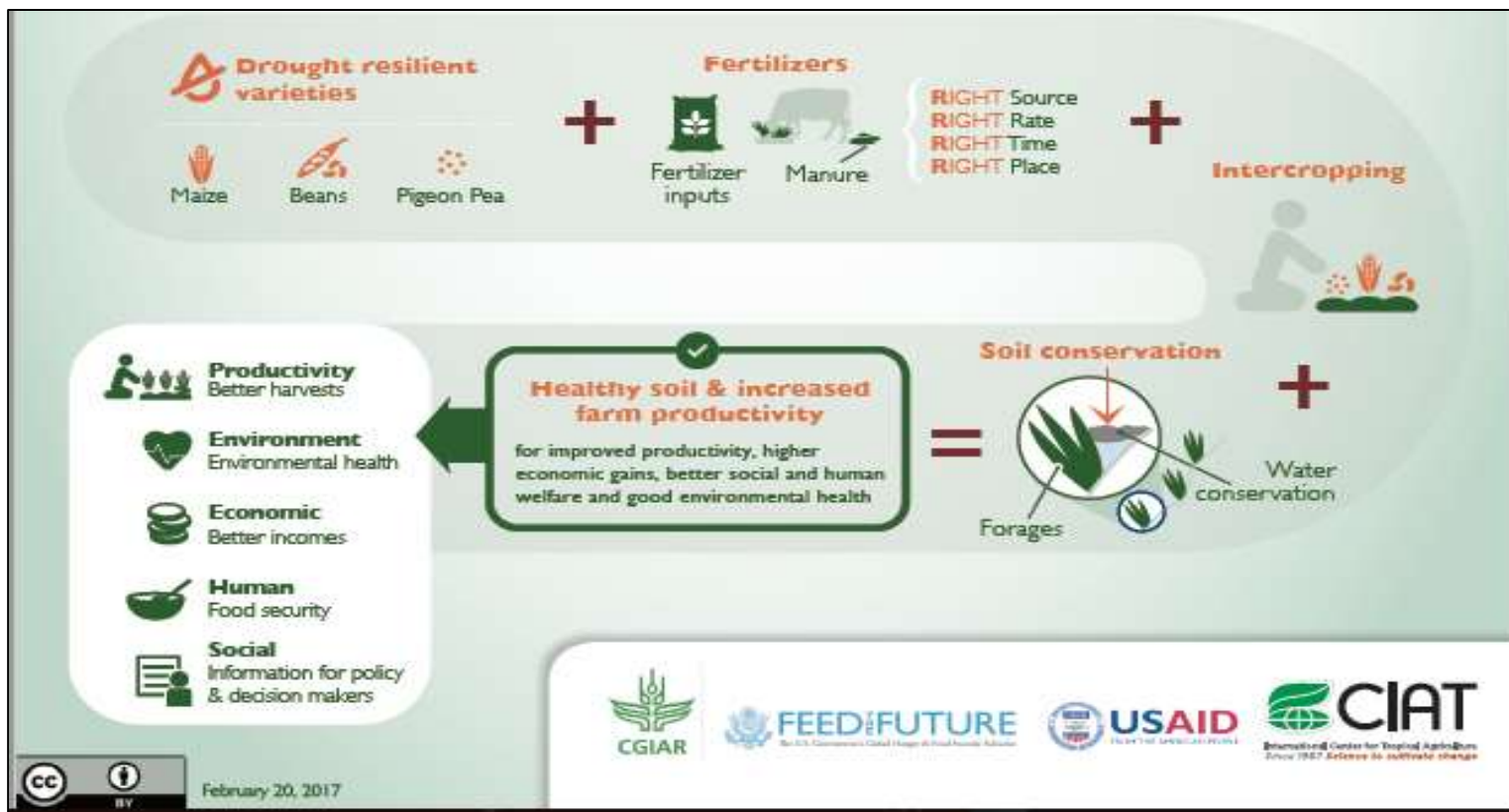


## Labour reduction:

- Construction of ridges
- Less weeding

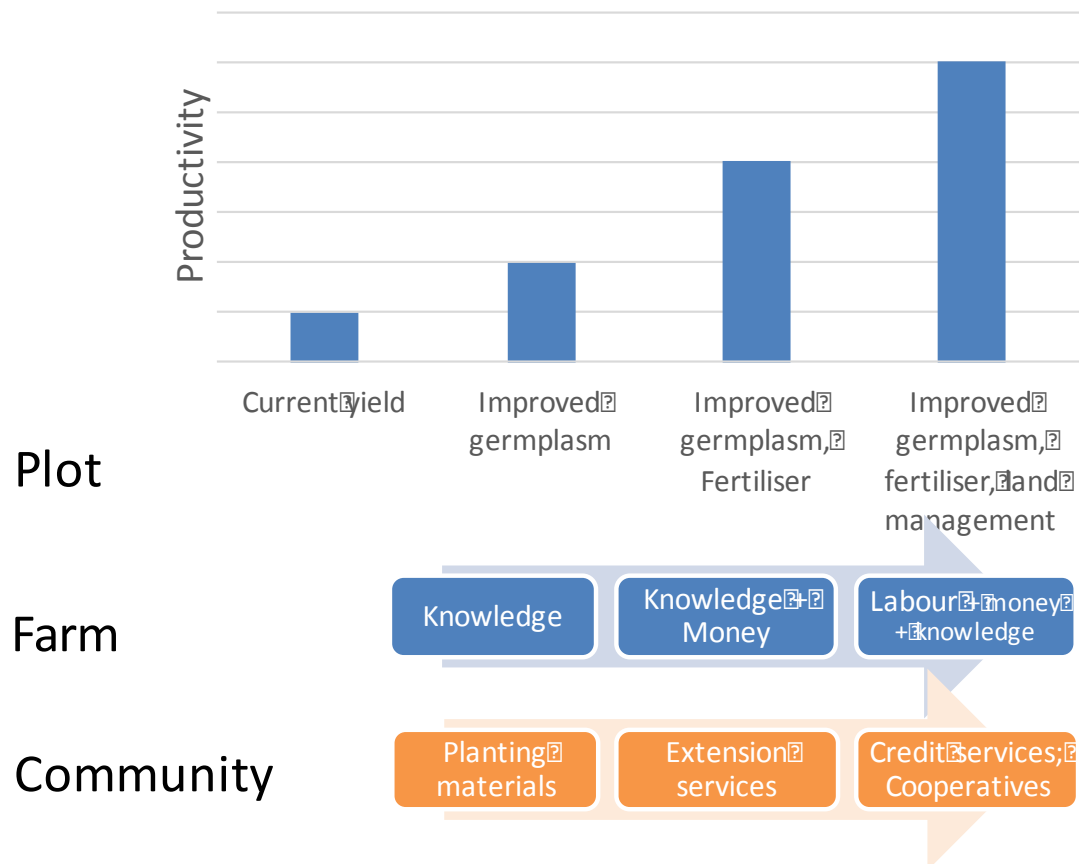


# Agronomic research is integrated





# Stepwise investments in Sustainable intensification





# Livestock



Poor and low quality pastures

***The cattle are hungry:***

- They are underfed most of the time (40% wet season; 80% dry season)
- There is poor storage, processing and utilization of crop residues
- There is lack of information about fodder, feeds and feeding



Planted fodders



Crop residues



Improved rations

	Phase 1	Phase 2	Yield increase (%)
Average milk yield (litres/cow/day)	5.8	10.7	84.5



- Feeding livestock and poultry is by tendency a task left to women and children
- Cutting and transporting grass to the homestead and chopping maize stover is a time-consuming and heavy business
- Choppers reduce labor time and burden and lead to a more efficient use of feed





# Poultry research to empower women (income, nutrition): Based on their involvement in local chicken rearing

Activity	Level of Involvement		
	Men	Women	Children
Feeding kitchen waste	-	***	**
Feeding supplements	*	***	**
Provision of water	*	***	**
Chicken house construction	**	*	***
Chicken selling	*	***	**
Chicken ownership	*	***	*

## Research in Poultry



Community Breeding:  
Improved genetics



Improved management:  
feeding, housing, disease  
control



Integrated feeding sources,  
including vegetables

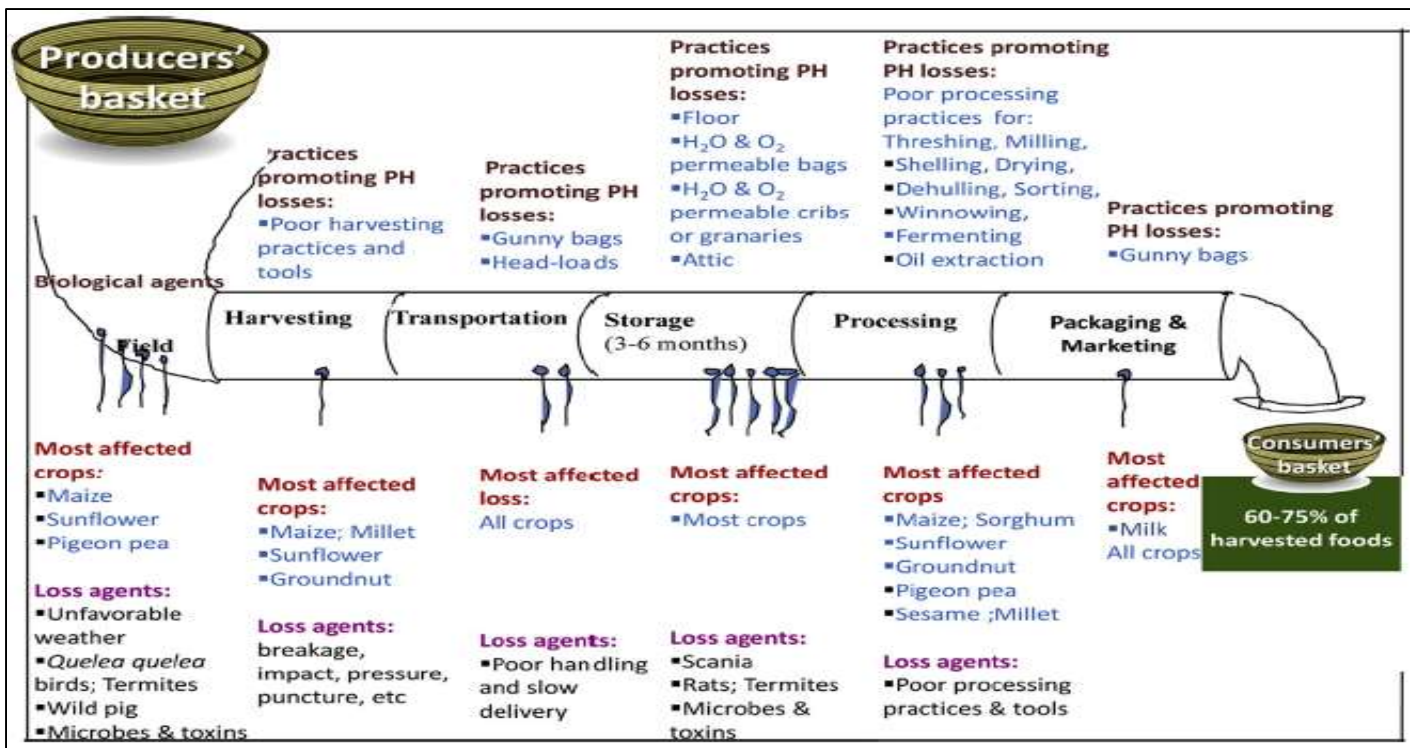




# **Minimizing food waste and improving food safety**



# The leaky food pipeline of the post-harvest practices in Babati: Loss agents and the most affected crops at each stage of the supply chain





# Low-cost solar dryer and mechanized maize sheller



- Save time for women for other agricultural and HH activities
- Lessen drudgery
- Assure improved grain quality for markets
- Stored grain is clean and less prone to deterioration



- Storage equipment
- Subsistence farmers: store to have year-round HH food supply
- Market oriented farmers: store to sell when prices improve...
- Fighting the mycotoxin menace



Tested different kinds of hermetic storage containers

Farmers Category	Net return (TZS)	BCR	IRR (%)
Low producers (LP)	(1,650)	0.5	(10)
Lower middle producers (LMP)	12,073	2.8	114
Medium producers (MP)	41,582	5.1	228
Upper middle producers (UMP)	71,808	5.1	225
Top producers (TP)	178,810	5.7	254
Average	67,087	5.4	243

Financial returns (PICS™ bags) increase with the amount of grain produced/stored



# Improving nutritional quality



# Introduction of healthy (traditional) vegetables

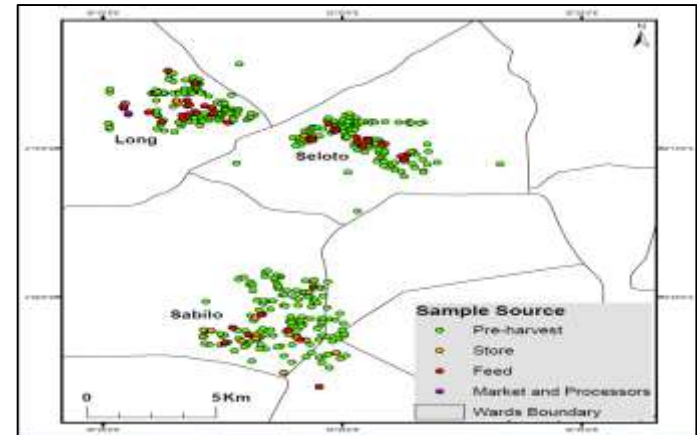
- Low vegetable consumption (<240 g/capita/day threshold)
- Recipes are used to educate households on nutrition, based on dietary diversity





# Reducing aflatoxin load in maize & groundnuts with Aflasafe

- Mapping of prevalence sites
- Awareness and training on application of Aflasafe





# Taking these technologies to scale for impact

Deploying new  
crop varieties

Land  
management

Improving  
nutritional quality

Livestock

Minimizing food waste and  
improving food safety

Enhancing resilience of  
cereal systems

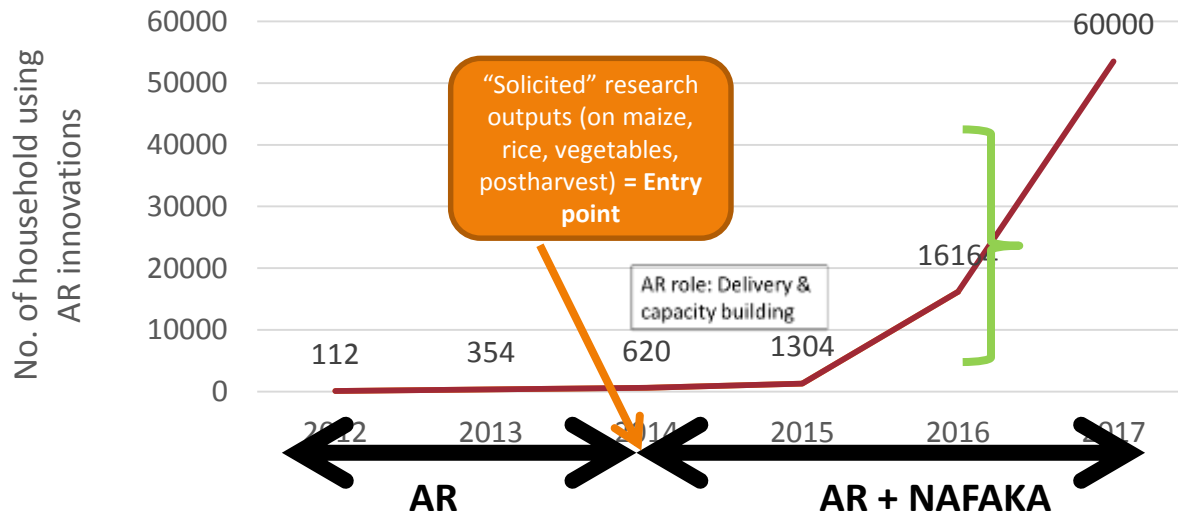


A handbook of  
concluded technologies  
is being produced for  
the development  
community





# Africa RISING partnership with NAFKA



**New research needs** (e.g. spill over adoption identification factor, recommendation domains, climate smartness, food safety)

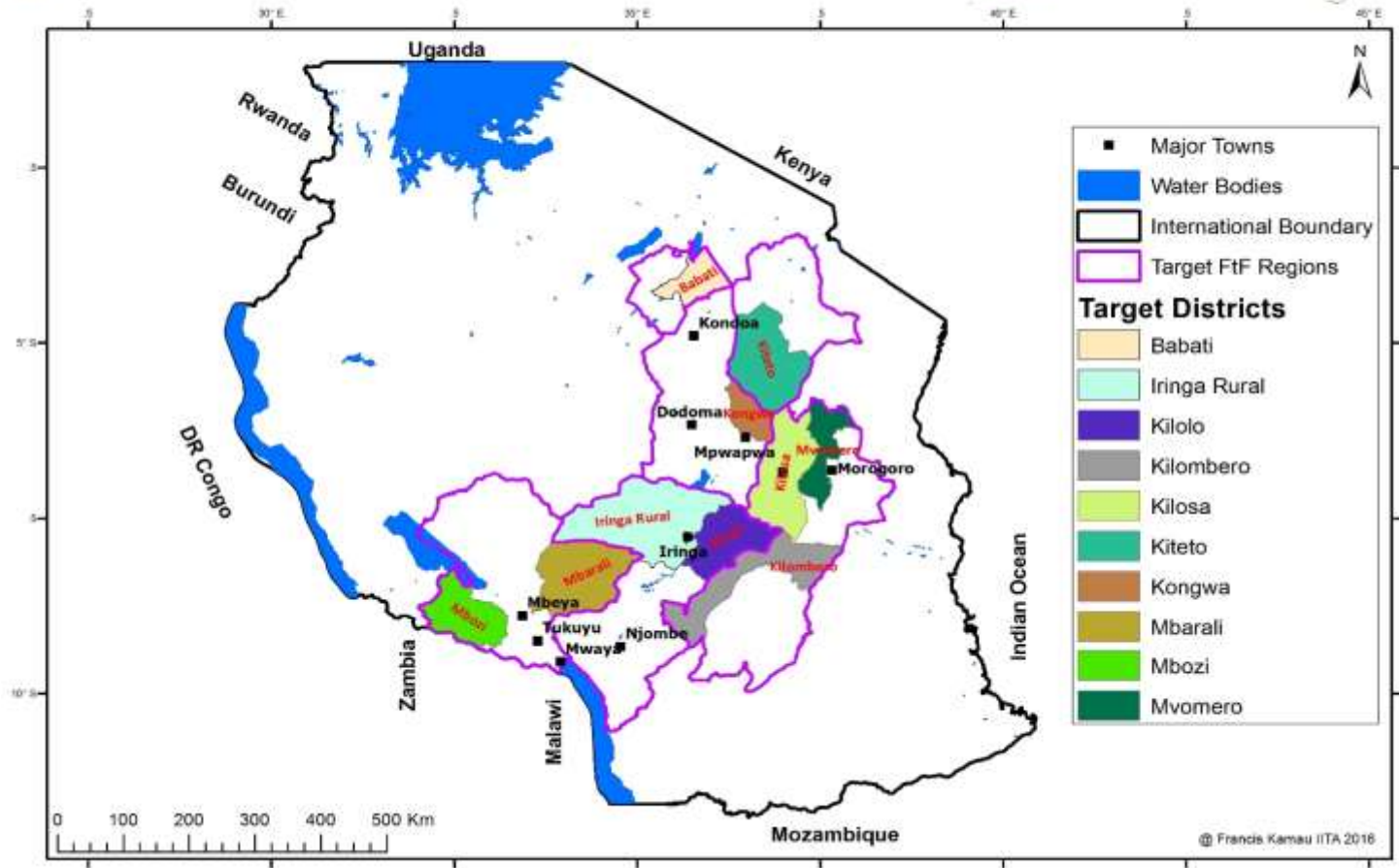


## Focus (2014-2017)

1. Introducing and promoting improved and resilient varieties of food crops (maize, legumes, rice, vegetables);
2. Disseminating best-bet agronomic management packages (GAPs);
3. Protecting land and water resources (incl. soil and water management, SAS/acidity/salinity);
4. Introducing and promoting postharvest management technologies (bring quality up to market standards);
5. Enhancing capacities of local communities.

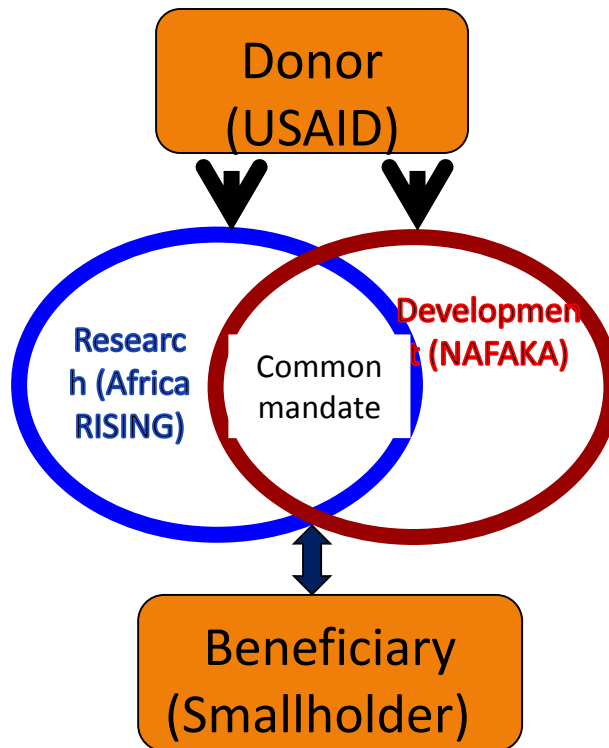


## Africa RISING - NAFKA Partnership Project Target Districts





## Partnership – arrangement



1. CG centers operate with national research institutions in all sites
2. Work closely with NAFKA team members; identify others – NGOs, private sector
3. Leverage resources (N2Africa, private sector)
4. Deepen work with DAICOs especially VAEOS/WAEOS
5. GIS for better targeting
1. Communication and coordination (**beneficiaries**, partners, donor team)



# Approaches





# Approaches




## All about aflatoxin:

What it is, its effects and how to control it

Following the death of five people (2 adults and three children) in Masikitiko district from aflatoxin poisoning, a team of experts are going from village to village educating the public about the poison. Today the team has arrived at the village of Mambo Mema village. Dr Joseph Mlinge from the Ministry of Agriculture, Livestock and Fisheries explains what is aflatoxin and how it's spread.

**What is aflatoxin?**

Aflatoxin is a poison produced by a fungus called *Aspergillus flavus*. The fungus resides in soil and decaying matter in the field. Therefore many crops can be contaminated by aflatoxins while in the field.







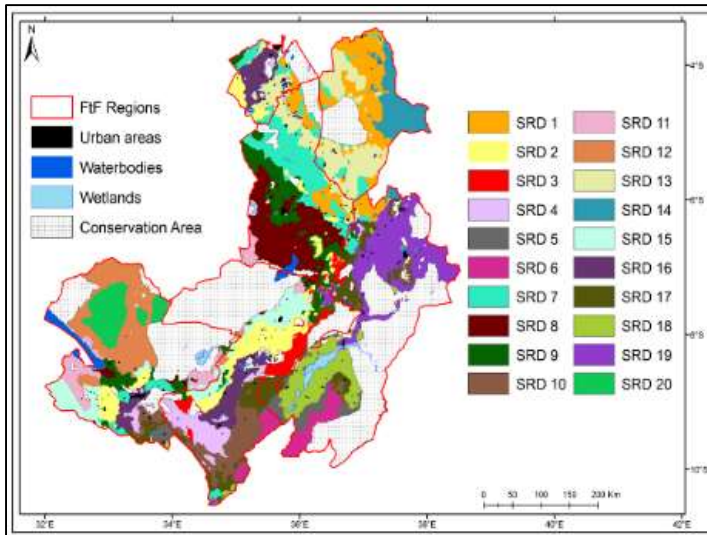
### AFRICA RISING-NAFAKA TRAINING MANUAL RICE ARI DAKAWA (JUNE 2016) MODULE 1

**FARM PLANNING  
OUTLINE**

- CONCEPT OF IMPROVED RICE VARIETIES
- SEED PREPARATION
- NURSERY PREPARATION
- LAND PREPARATION
- RICE PLANTING
- DIRECT PLANTING
- TRANSPLANTING




# IT-based approaches



GIS-based recommendation domains



ICT-based 'Mwanga' platform



## Achievements

- About 1000 demonstration sites established
- Trained 185 government extension staff in agronomy, extension, data management
- Strengthening rural agro-dealer network by training 141 VBAAAs
- 161 QDS producers trained and supported (30 MT legumes, 162 MT rice)
- 500 ha (legumes); 10,000 ha (rice)
- Productive youth engagement (50 local artisans)
- NAFKA support to VBAAAs (41 grants) and 110 producer organizations (POs) grants for post-harvest technologies (shellers, storage, threshers)
- Increased sales of PICS bags (55 POs with WFP contracts, others)





## Progress on FtF Indicators – Sept 2017

Indicator	FY 2017 Target	FY 2017 Achievement	LOP target	LOP Achievement (%)
<b>EG.3.2-18:</b> Number of hectares under improved technologies	58,000	61,489 (41,079 maize, 20,152 rice, 258 vegetables)	58,000	106
<b>EG.3.2-17:</b> Number of farmers and others who have applied new technologies	47,000	48,452	47,000	103
<b>EG.3.2-1</b> Number of individuals who have received short-term agricultural sector productivity or food security training	47,200	66,608	47,200	141.1
<b>EG.3.2-4:</b> Number of private enterprises (for profit), producers organizations and associations/organizations benefitting (mostly farmers' groups)	200	231	200	115.5
<b>EG.3-1:</b> Number of rural households benefiting directly from interventions	47,000	53,597	47,000	114



- Long term capacity building (Graduate training)
- Number of Tanzanian students mentored by AR scientists and conducting research at AR sites
  - 2 PhD
  - 17 MSc
- Main partner: iAGRI



## Donor



## Development partner



## CGIAR/IARC partners





## Other partners

- Ministry of Agriculture, Livestock and Fisheries (MALF)
- ARI Hombolo, ARI Chollima/Dakawa; ARI Selian; ARI Naliendele, ARI Uyole, KATRIN; HORTI-Tengeru
- TOSCI
- NAFKA consortium: RUDI, FIPS, MVIWATA
- Universities: Sokoine University of Agriculture, University of Dodoma, Ohio State University (iAGRI), WUR, MSU
- District local governments and AICOs
- Private sector: Aminata Seeds, Meru Agro, Minjingu Fertilizer Co, millers, processors, equipment manufacturers.



# Thank You

*Africa Research in Sustainable Intensification for the Next Generation*

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