Identifying impact pathways for DLC sectors

2023 Dryland Legumes and Cereals Review and Planning Meeting
ALISA Hotel-North Ridge
Accra Ghana 23rd -26th January 2023

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Outline

1. Impact Framework
2. Impact Pathways and Strategic Investments
    a) *Data and Decision Support Systems*
    b) *Policy, Institutional and Social Innovations*
    c) *Genetic Innovations*
    d) *Seed Delivery Systems*
    e) *Farmer Capacity in Agronomy, NRM*
3. Conclusions (strategic considerations)

Impact framework

CGIAR impact framework

IMPACT PATHWAYS

Science-based innovations
knowledge products, technologies, services, and other solutions along a scaling pathway.

Targeted capacity development
working with farmers, firms, and organizations —to improve the use of innovations

Advice on policy
including business strategies, institutional arrangements, investment programs, formal public policies

IMPACT AREAS
(DESTINATIONS)

Nutrition, Health, Food Security

Poverty Reduction, Livelihoods, Jobs

Gender Equality, Youth, and Social Inclusion

Climate Adaptation, Mitigation

Environment Health and Biodiversity

Example: A sketch of CGIAR Genetic Innovations Impact Pathway

Investors, breeding and seed delivery teams guided by **market evidence**

CGIAR & partners use state-of-the-art technologies to **fast-track genetic gains on farmers fields**

CGIAR & partners well-targeted new varieties with **demanded** traits

Co-investments by public and private sector partners supports breeding …and uptake

Public and private seed-sector actors invest in **scaling-up new varieties**

Farmers adopt superior varieties more **broadly and rapidly**

Farmers have **access** to and **use** superior varieties

Women, youth and marginalized groups participate in, and **benefit** from improved crops and value chains

Courtesy: Kevin Pixley, CGIAR

The challenges and context

>70%

of people in Africa depend on informal jobs

Agriculture still accounts for over

60% of jobs

25% of GDP

Yields still less than

1-2/ha

Africa accounts for

2%

of global agric. value chains

422 Million

Africans below global poverty line <$1.9/day

Undernourished

282 Million

in 2021 *(240 million in 2015)*

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Source: FAO, World Bank

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Low adoption rates represent an on-going challenge

Country	Sorghum		Millet		Groundnut	
	Year	%	Year	%	Year	%
Uganda	2010	40	2015	31		
Ethiopia	2012	37.2	2011	37	2015	35
Burkina Faso	2009	3.3	2009	2.6	2009	24.8
Nigeria	2009	20	2018	19	2009	19.4
Mali	2009	32.6	2009	31.1	2009	19.6

Sources

Uganda: Sorghum (Gierend et al., 2014); Millet (Orr & Muange, 2022); Tanzania: Sorghum (Kaliba et al., 2018); Groundnut (Bakari et al., 2021); Ethiopia: Sorghum (Kinfe &Tesfaye, 2018); Millet (Orr & Muange, 2022); Groundnut (Ahmed et al., 2016); Burkina Faso: Sorghum (Ndjeunga et al., 2015); Millet (Ndjeunga et al., 2015); Groundnut (Ndjeunga et al., 2015); Nigeria: Sorghum (Ndjeunga et al., 2015); Millet (Vabi et al., 2020); Groundnut (Ndjeunga et al., 2015); Mali: Sorghum (Ndjeunga et al., 2015); Millet (Ndjeunga et al., 2015); Groundnut (Ndjeunga et al., 2015

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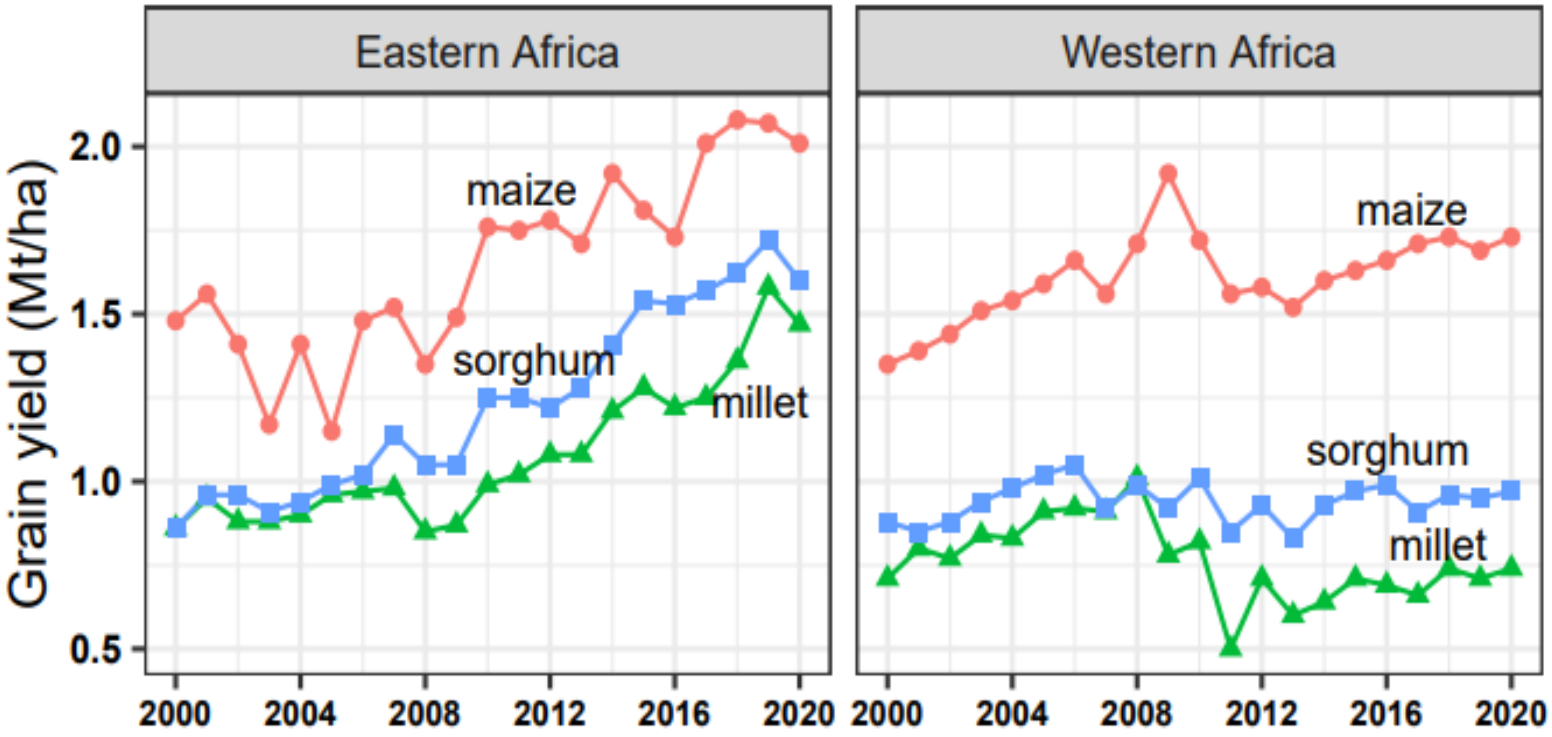
Recent Yields in EA and WA: maize, millet, sorghum



Impact opportunity

A lot of families in Africa spend anywhere between

40-50%
of their income on food

Alternative impact entry points

Bottom of pyramid: Relatively land-scarce, net-buyers: Buy more than they sell DLC crops. Can benefit from sector-wide increased supply of DLCs for **food security and nutrition**

Rarely purchase any seed or inputs

Middle of pyramid: Enough land to be self sufficient with occasional surplus Can be self-sufficient in DLC crops. Impacts are **food security** and **income** from surplus sale

Sometimes purchase some seed and inputs

Top of pyramid: Relatively land abundant, commercial Have the resources to engage in **income generation** from food farming. Drivers of **aggregate food supply**

Generally, purchase seed and inputs

Example: food supply and security

Broad Crop Categories

- **Major staple crops** *widely grown, locally adapted*
- **Input responsive**

Key Varietal Traits

- **Agronomic traits:** *high yield, early maturity, resistance to specific stresses*
- **Preferred end user traits:** *consumption, processing, cooking*
- **End user traits for markets:** *low perishability, tannin content, milling quality*

Promotion Strategies

- **Traditional channels:** *ag. extension visits; posters; field days; rural radio*
- **Social networking:** *cell phones, SMS.*

Based on: Sperling et al. (2022)

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Example: climate resilience

Broad Crop Categories

- **Tolerance to abiotic stresses:** *heat/drought tolerant, water efficient*
- **Strengthening resource base:** *nitrogen-fixing, fodder quality*

Key Varietal Traits

- **Diverse maturity classes:** *to allow short season diversification*
- **Stress adapted:** *heat, pests, low fertility*
- **Suitable for intercropping:** *better rotational systems, improved soil health, resource use (e.g., water) efficiency*

Promotion Strategies

- **Targeted extension:** *using new digital capabilities for hyperlocal solutions*

Based on: Sperling et al. (2022)

Possible Impact Pathways:

Strategic Investments and Actions

Data, decision support systems

- **Gap - l**ack of regular, easily accessible and quality data
  - to guide actions across the board: e.g., policies, strategies and investments (public and private)
    - Distributed, crowdsourced data collection
    - Collected annually
    - On a minimum set of decision variables
    - Data to live in public institutional repositories
    - Diversify multi-stakeholder analysis
- **Any** innovation have to be evidence-based
  - (scientific evidence)

Policy, institutional and social innovations

- Policy reforms to support "informal" or "intermediate" seed systems

Examples:

  - Tanzania (and now Uganda): mainstreaming of QDS
  - Mali, Burkina Faso: examples of integrating formal breeding with local, village-based farmer co-ops

- Carefully calibrated division of labor between "informal" and "formal" systems

- Formalize role of grain markets
  - as efficient injection points
  - recognize "grain-seed"

Re-orient breeding strategies

- Focus on locally (as opposed widely) adapted varieties (e.g., Mali as per *Rattunde et al., 2022*)

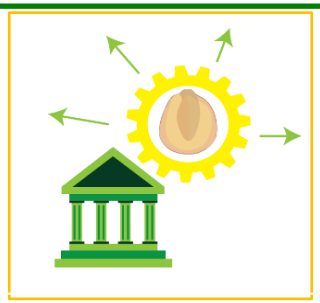
- Hybrids that are stable when recycled (grain-seed) (*Rattunde et al., 2022*)

- Sorghum/Millet to match or beat maize in moderate and low potential production zones
  - Leverage the low-input advantage (esp. sorghum, millet)

- Work on consumer characteristics (sorghum/millet)

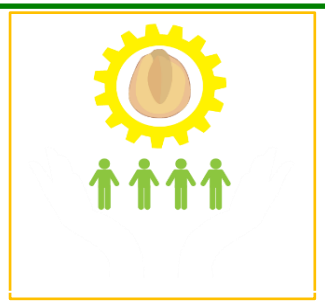
Innovations in seed delivery for impact (1/7)

Key principles to remember



Public sector-driven seed production and distribution

- e.g.: time bound learning subsidies

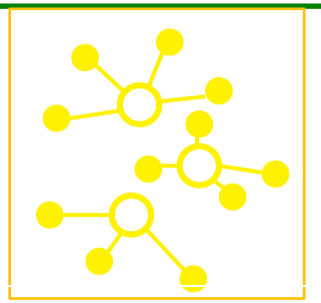


Social enterprise models

- impact investing

Community-based full cost recovery models)…Focus on social capital

- trust
- reciprocity
- reliability



Localized, low profit margin seed production and distribution

- informal
- semi-formal
- group-based
- low capital

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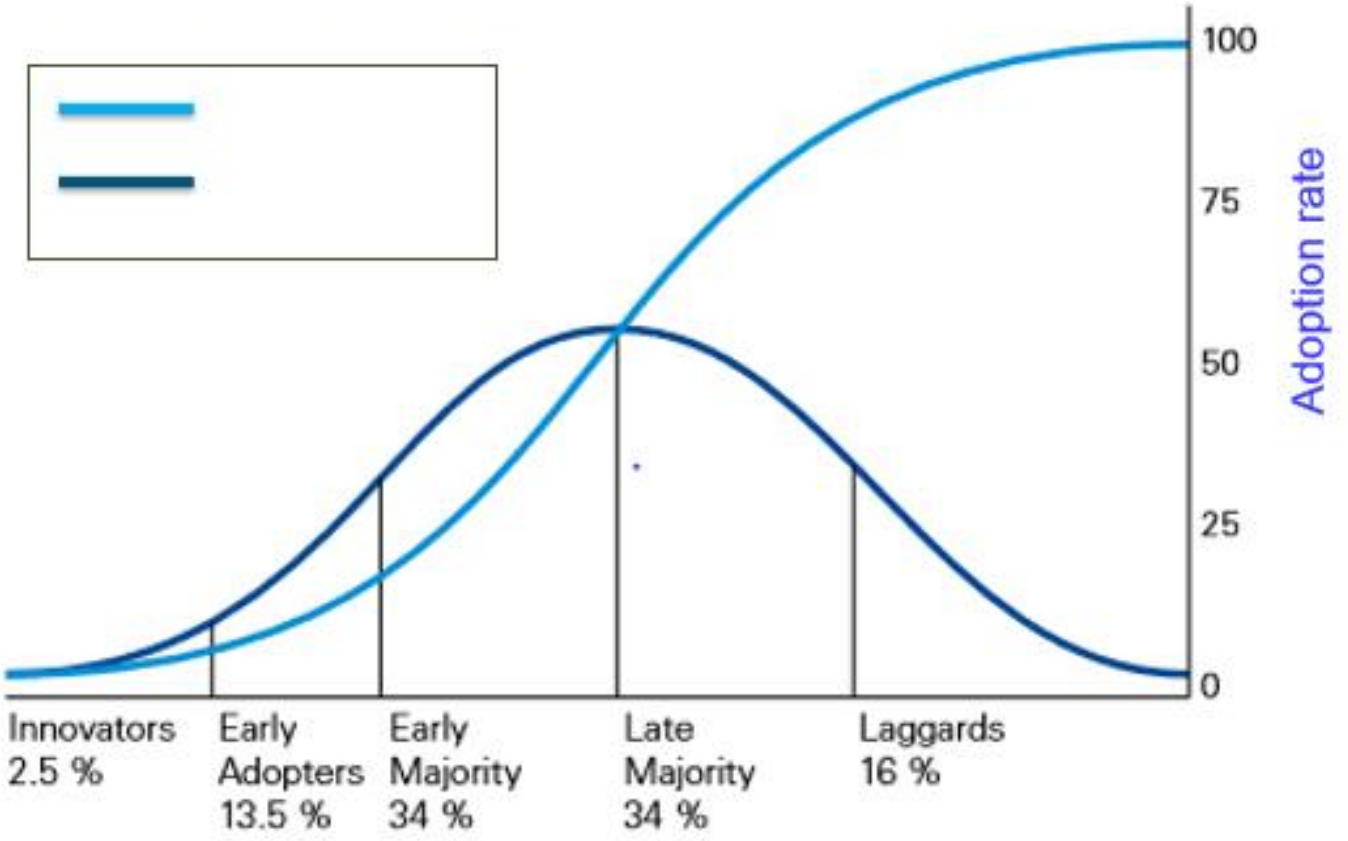
Innovations in seed delivery for impact (2/7)

Identify the tipping points



What does this mean in practice?

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Innovations in seed delivery for impact (3/7)

- Consider periodic seed marshal plans …but
  - use to stimulate farmer awareness and demand
  - through local businesses and farmer organizations
  - sector-wide, time-limited (a variation of current subsidies)
  - **regional and global solidarity required**

Innovations in seed delivery for impact (4/7)

Innovate last mile delivery

- **Basic principle:** Farm gate delivery
  - seed goes to the farmer…not the other way round
  - mobile delivery is proposed
  - advance order systems

- **Borrow** logistical principles from large- scale humanitarian distribution
  - These operations achieve a lot in difficult environments

Innovations in seed delivery for impact (5/7)

Social impact business models

- Models driven by social returns (not necessarily financial ones)
  - Consider these as social investments
  - Laying the ground for self-sustaining systems

- 3-5% of DLC seeds (especially the cereals) move through formal business channels (Sperling et al., 2022)

- 95-97% must move through other informal business channels

Innovations in seed delivery for impact (6/7)

Manage seed costs where its an issue

- Seed costs can be considerable if
  - farmers cultivate large tracts of land
  - use the recommended seed rates
  - But yields are low
- Innovate business models able to deliver seed at moderate mark-ups relative to grain

	Pearl Millet	Groundnut
Typical area in major producing areas (ha)	1.0	0.3
Sowing need *(Kg per average area planted)*	20.0	15.0
Yield/Harvest *(Kg per average area planted)*	500-1000	125.0
Seed requirements *(% of harvest)*	3-5	12.0

Source: Sperling et al. (2022) based on Mali SSSA (2006)

Innovations in Seed Delivery for Impact (7/7)

Manage seed costs where its an issue

Improved sorghum seed costs anywhere from 30% to 400% the price of grain

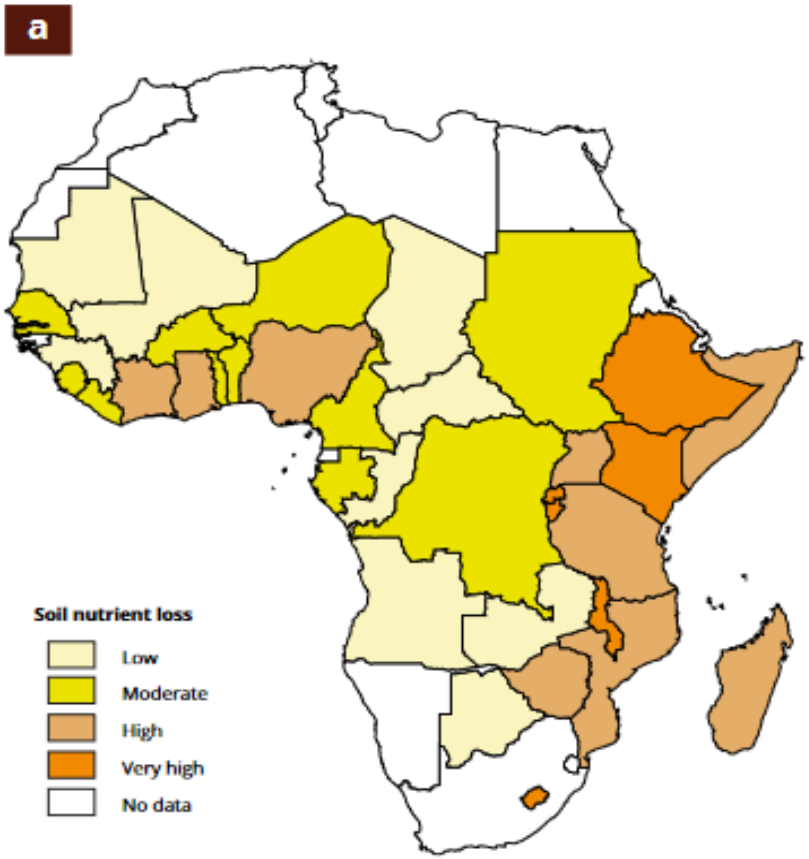
	Maize hybrid	Maize OPV	Sorghum	Millet	Common Bean	Cowpea
B. Faso	9.9 : 1	3.3 : 1	4.2 : 1	-	-	-
Ghana	6.1 : 1	4.3 : 1	-	-	-	2.0 : 1
Ethiopia	3.5 : 1	2.7 : 1	1.3 : 1	-	-	-
Uganda	4.3 : 1	2.0 : 1	3.7 : 1	2.4 : 1	1.7 : 1	
Tanzania	8.7 : 1	5.2 : 1	2.5 : 1	-	1.4 : 1	-

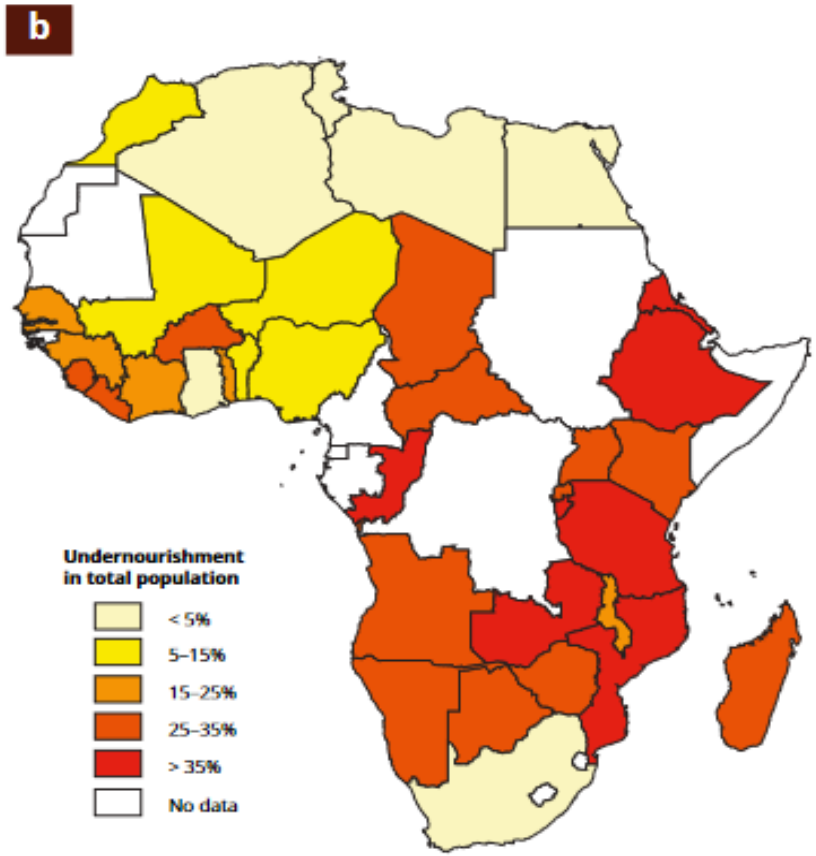
Source: *https://www.tasai.org/en/products/country-reports/ (Respective country seed sector assessment reports)*

Prioritize soil health

- 40% of Africa's soils are degraded (soil erosion, soil nutrient depletion, soil organic matter decline and biodiversity loss)

Soil nutrient loss and hunger (Jones et al. (2013)





Strategic Considerations

Match investments in maize and dryland cereals

Short to medium term investment proposals for key crops in Africa

	Short Term (Baseline)	Medium Term	Long Term	Crop Totals
Sorghum and Millets	40.4	42.6	73.9	156.9
Maize	**130.1**	**-**	**-**	**130.1**
Wheat	62.0	62.0	54.0	178.0
Rice	106.7	48.2	45.3	200.1
Term Totals	339.2	152.8	173.2	665.2

Source: ***African Development Bank (2015):*** *Cereal Crops: Rice, Maize, Millet, Sorghum, Rice*

Strategic considerations

Genetic improvements for resource use efficiency

Cost of inputs for farmers

Cost of the consumer plate

Match investments in maize vs dryland cereals

Redouble efforts in soil health

including agronomy and NRM

Leverage emerging consumer trends

Beverage industries

Dietary changes

Supported by value chai growth

Take home principles for impactful seed delivery

COLLABORATION

Based on comparative strengths, complementarities **from breeding to grain retail**

LOCALIZATION

Avoid trickle down models. Focus on **bottom of pyramid** and build from bottom up

BUSINESS INNOVATION

Innovate business models that can deliver seed at moderate **mark-ups relative to grain**

Thank you!



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