



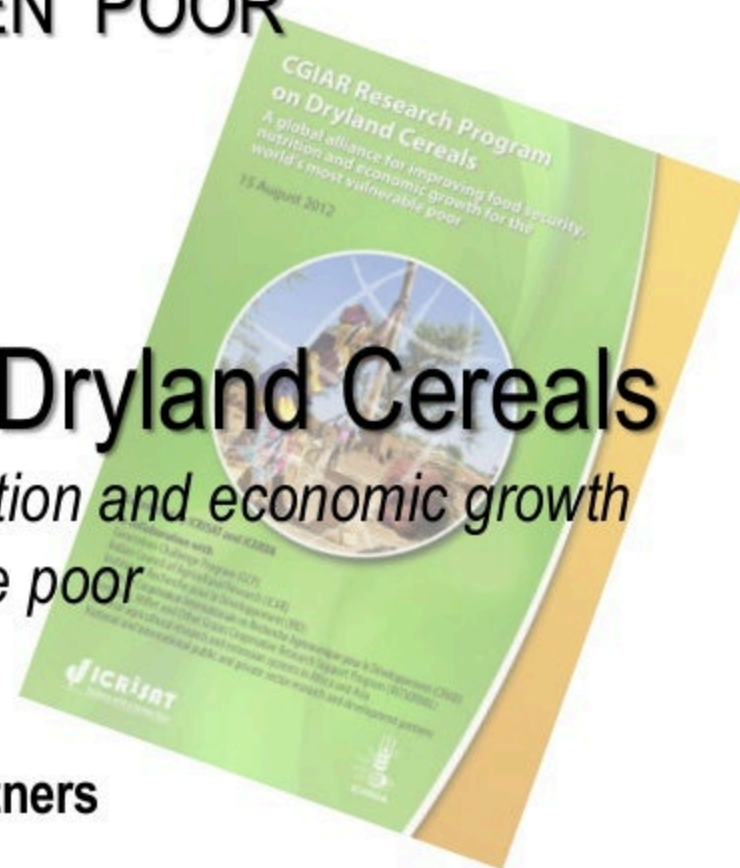
RESEARCH  
PROGRAM ON  
Dryland Cereals

## FEEDING THE FORGOTTEN POOR



# CGIAR Research Program on Dryland Cereals

*A global alliance for improving food security, nutrition and economic growth for the world's most vulnerable poor*



**Discussion with Donors & Partners  
Montpellier, 28 June 2013**



RESEARCH  
PROGRAM ON  
Dryland Cereals



and public and private institutes and organizations,  
governments, and farmers worldwide

## FOCUS ON 4 DRYLAND CEREALS

Crop	Production (MT)		VOP (USD billion)	
	LIFDC	World	LIFDC	World
Barley	10.1	155.1	2.94	36.76
Millets (finger and pearl)	33.5	35.2	13.37	13.68
Sorghum	36.7	66.8	10.98	15.60
<b>Total Dryland Cereals</b>	<b>80.3</b>	<b>257.1</b>	<b>27.29</b>	<b>66.04</b>

<sup>1</sup> FAOSTAT 2009. FAO's classification and criteria for low-income, food-deficit countries (LIFDC) can be found at <http://www.fao.org/countryprofiles/lifdc.asp?lang=en>



Barley



Finger millet



Pearl millet

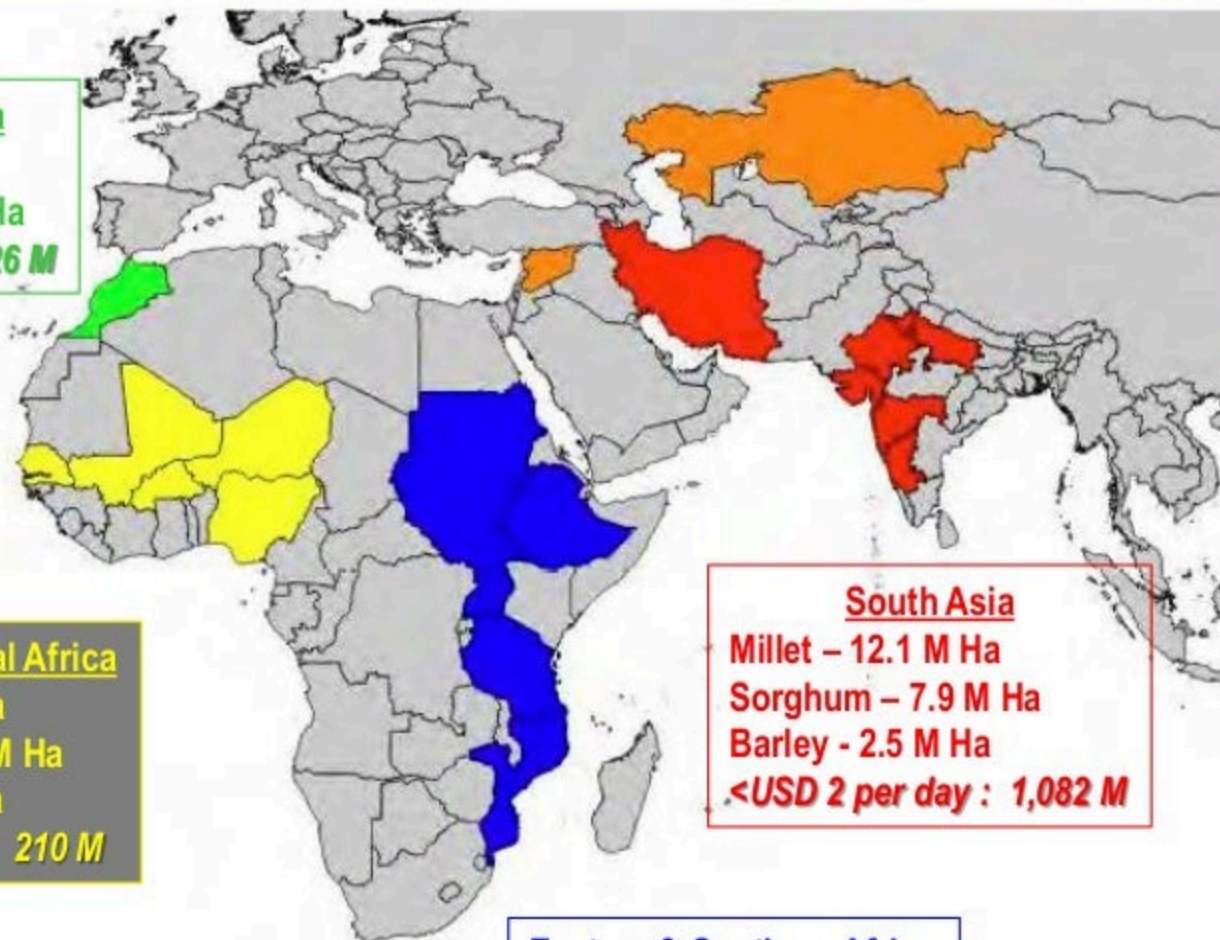


Sorghum

# TARGET REGIONS

BASED ON

## PRODUCTION AREA AND POVERTY LEVEL



**Northern Africa**  
Barley – 3.6 M Ha  
Sorghum – 0.1 M Ha  
<USD 2 per day : 26 M

**Central & Western Asia**  
Barley – 7.4 M Ha  
Sorghum – 0.5 M Ha  
Millet – 0.2 M Ha  
<USD 2 per day : 20 M

**Western & Central Africa**  
Millet – 16.8 M Ha  
Sorghum – 14.2 M Ha  
Barley – 0.5 M Ha  
<USD 2 per day : 210 M

**South Asia**  
Millet – 12.1 M Ha  
Sorghum – 7.9 M Ha  
Barley - 2.5 M Ha  
<USD 2 per day : 1,082 M

**Eastern & Southern Africa**  
Sorghum – 10.8 M Ha  
Millet – 4.1 M Ha  
Barley – 1.1 M Ha  
<USD 2 per day : 230 M

# 7 PRODUCT LINES

PL1. Sorghum for West Africa

PL2. Pearl millet for East and West Africa

PL3. Sorghum for East Africa

PL4. Finger millet for East and Southern Africa

PL5. Barley for Africa and Asia

PL6. Pearl millet for East Africa and Asia

PL7. Sorghum for South Asia

SUBSISTENCE

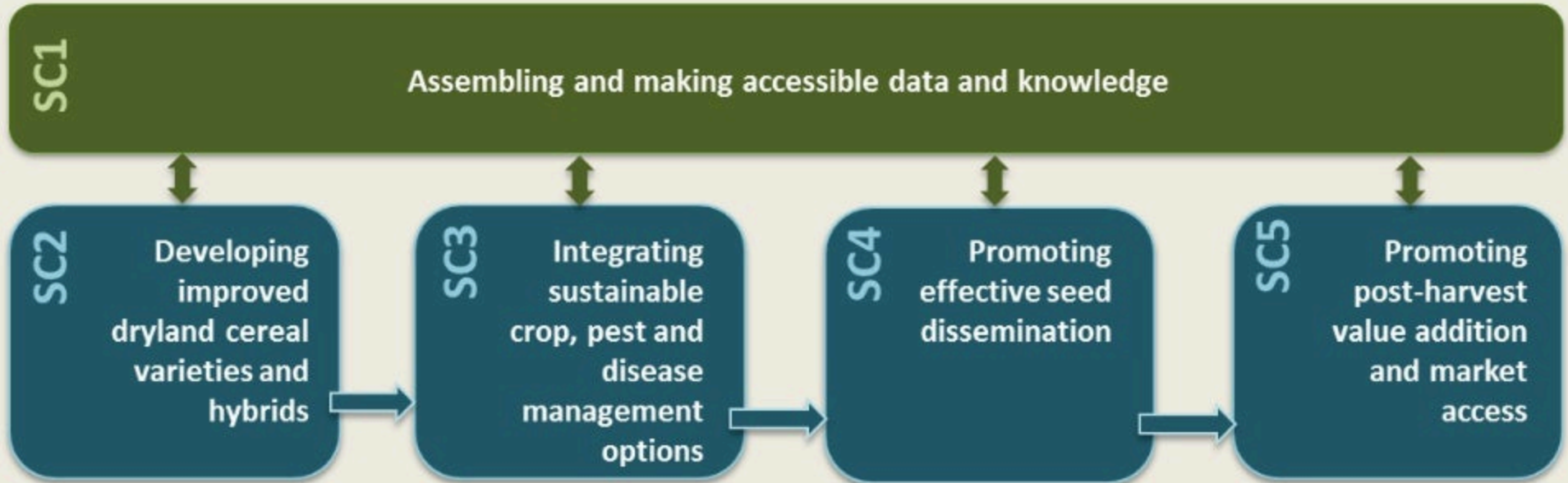


SMALLHOLDER FARMERS



MARKET-ORIENTED

# DELIVERED VIA 5 STRATEGIC COMPONENTS



## EXPECTED IMPACT IN 10 YEARS

- 16% increase in dryland cereal farm-level production on at least 11.8 M ha
- 5.8 million smallholder households; 34 million total beneficiaries
- \$1.3 billion cumulative net income benefits

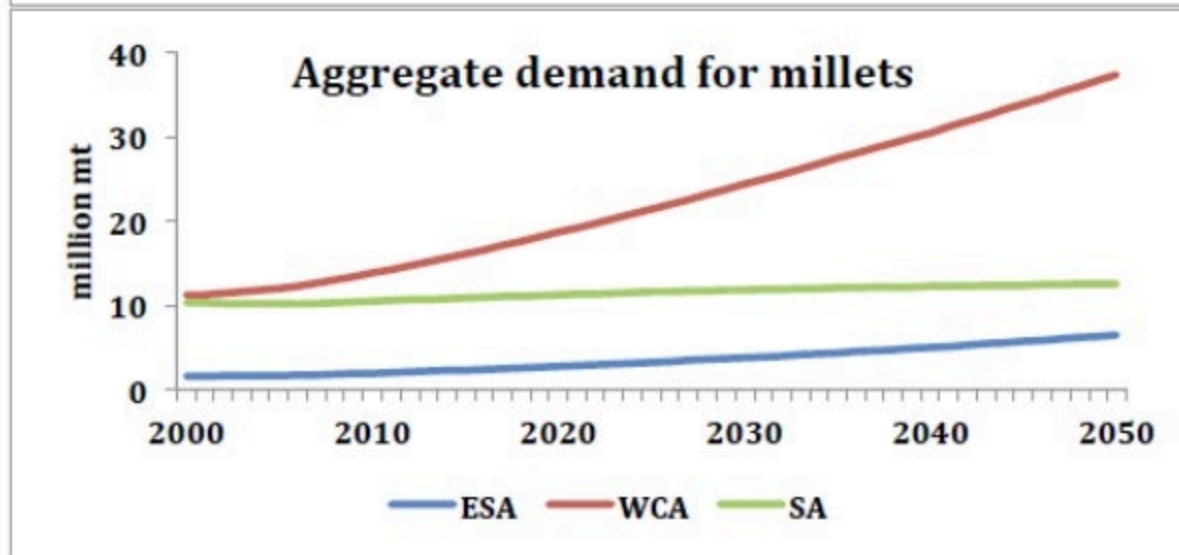
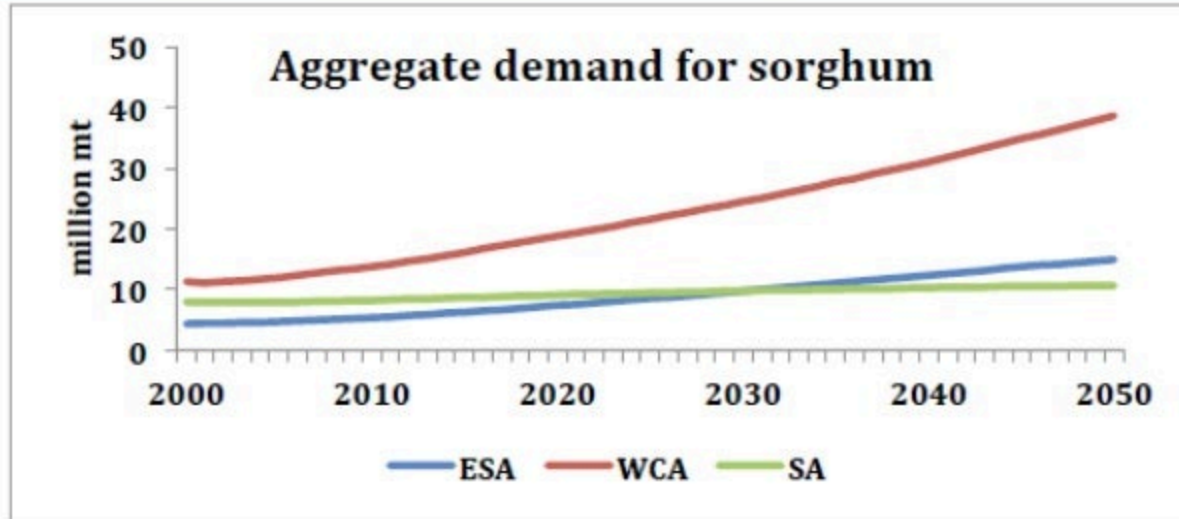


## FOCUS-CROP TRENDS in TARGET REGIONS (1981-2010)

Region/Crop	Trends (1981 to 2010)		
	Production	Yield	Area
<b>WCA</b>			
Sorghum	7%	-1%	9%
Pearl Millet	7%	0%	7%
<b>ESA</b>			
Sorghum	4%	1%	3%
Pearl Millet	5%	0%	5%
Barley	4%	0%	3%
<b>CWANA</b>			
Barley	1%	1%	1%
<b>SA</b>			
Sorghum	-5%	2%	-7%
Pearl Millet	1%	5%	-4%
Barley	1%	7%	-5%

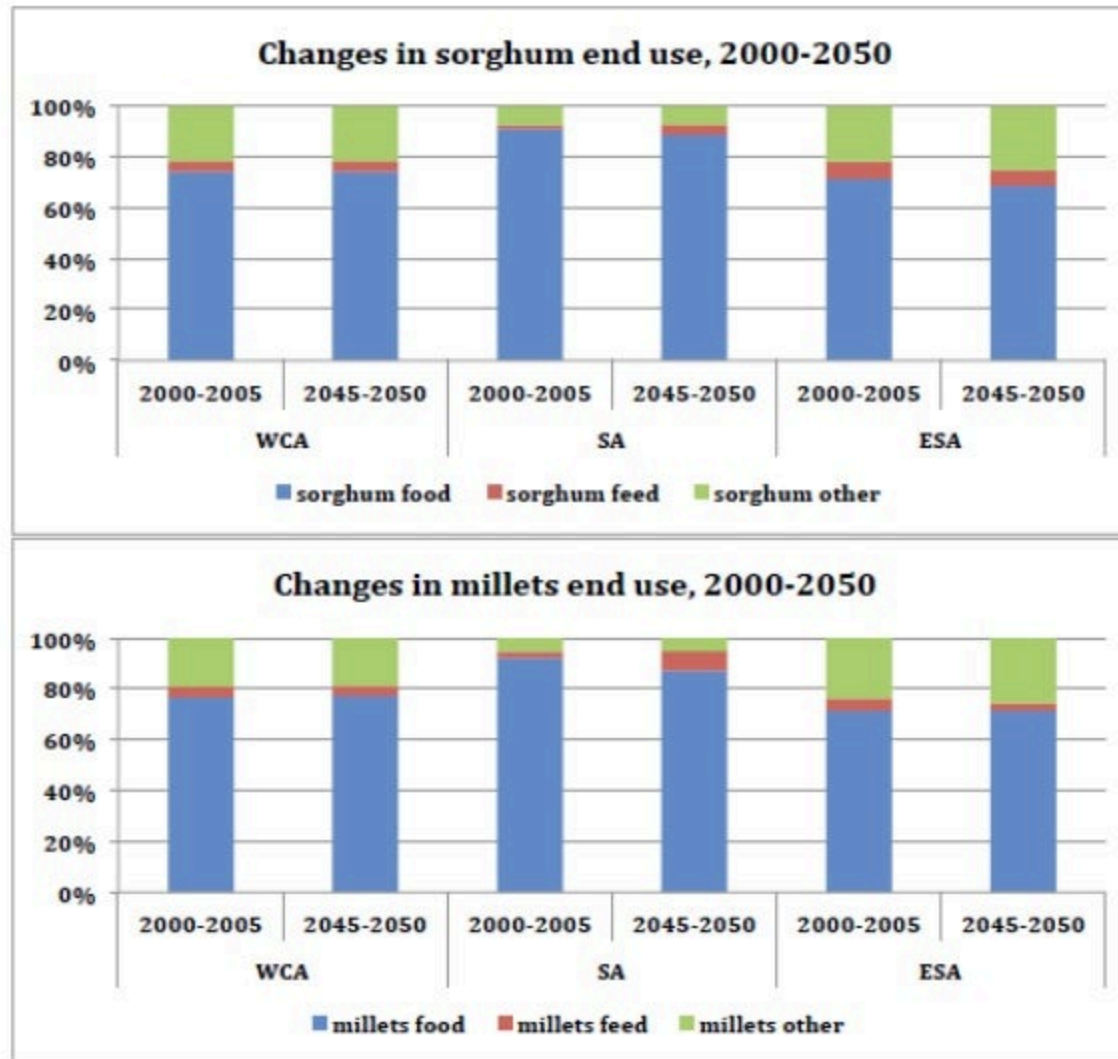


# TRENDS IN AGGREGATE DEMAND, 2010-2050

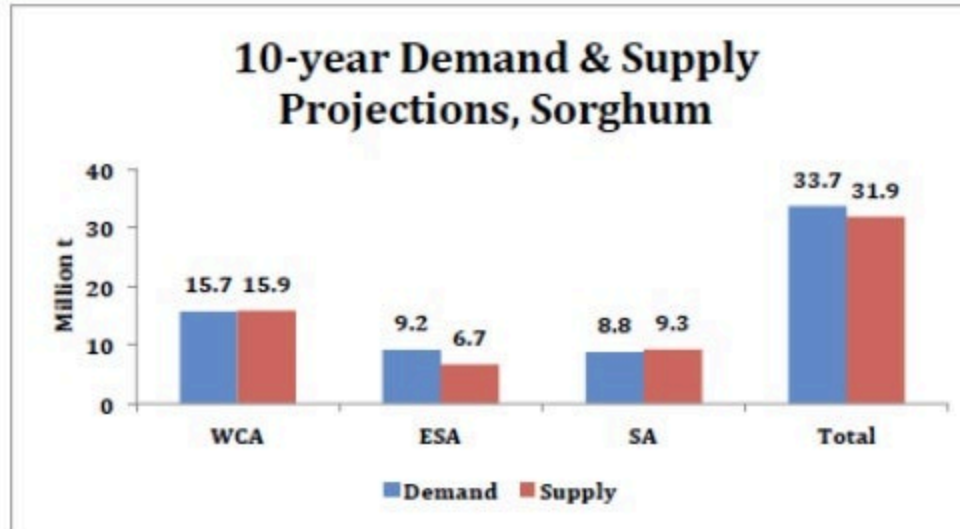




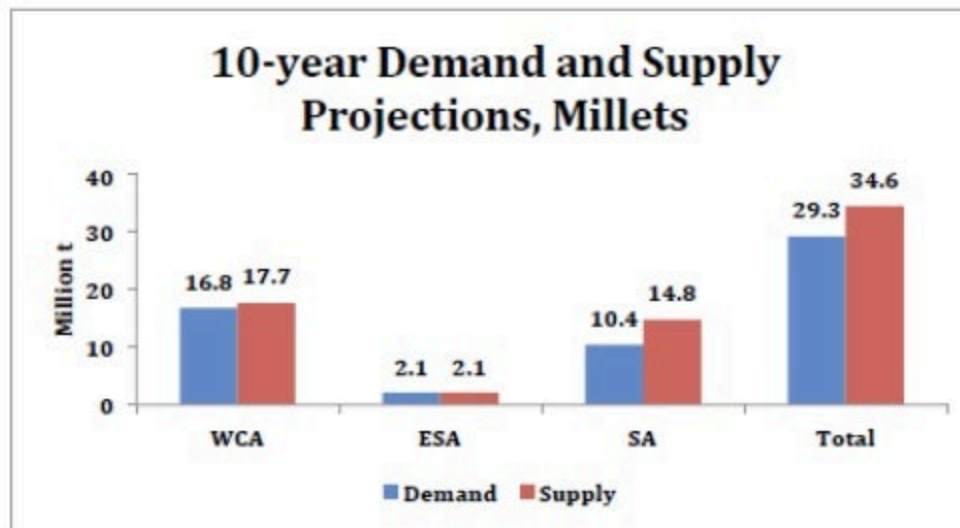
# CHANGES IN END USE, 2000-2050



# 10-YEAR DEMAND & SUPPLY PROJECTIONS



Target countries: WCA: Burkina Faso, Mali, Niger, Nigeria. ESA: Ethiopia, Mozambique, Sudan, Tanzania. SA: India.



Target countries: WCA: Burkina Faso, Mali, Niger, Nigeria, Senegal. ESA: Sudan, Uganda. SA: India

# ADOPTION CONSTRAINTS



# R4D OPPORTUNITIES THROUGH THE VALUE CHAIN



*Barley straw for fodder*

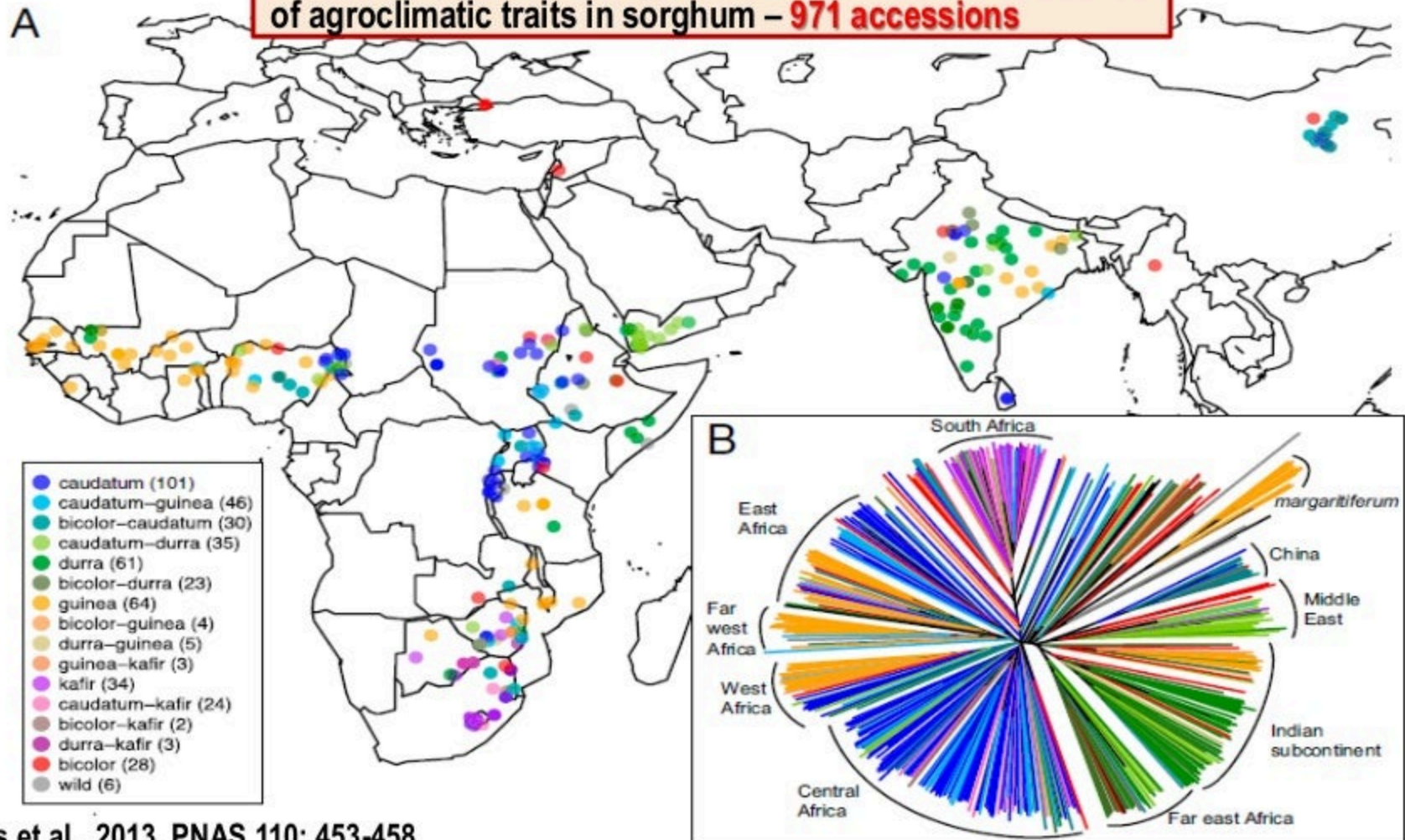
- Crop improvement for stable yield, nutritive value
- Crop management
- Storage, post-harvest processing
- End-use products for evolving consumer preferences
- Market access

*New  
processed  
products  
from  
sorghum*



# MOMENTUM FROM EXISTING RESOURCES: a snapshot

Population genomic and genome-wide association studies  
of agroclimatic traits in sorghum – **971 accessions**



Morris et al., 2013. PNAS 110: 453-458

# MOMENTUM FROM EXISTIG INITIATIVES – a snapshot

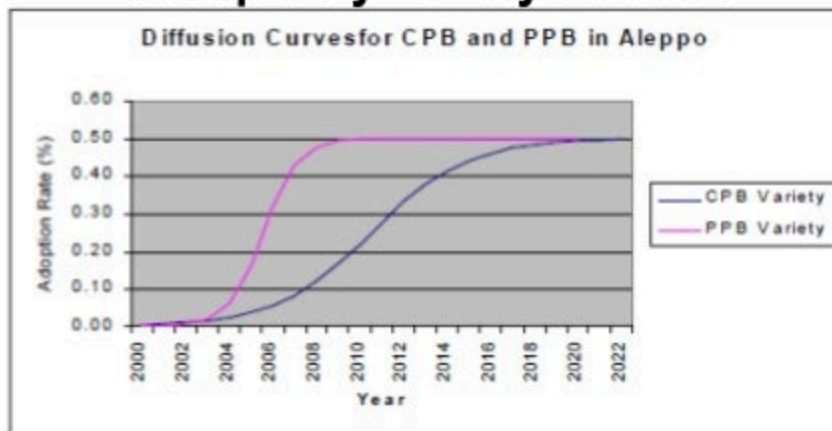
## Sorghum yield increase via HOPE



## Affordable Mini-Packs



## Participatory Variety Selection



## Agriculture & Nutrition Training



# INTERMEDIATE DEVELOPMENT OUTCOMES

1. **Improved productivity** of dryland cereals in smallholder farming systems in Africa and Asia
2. **Increased and stable access to** dryland cereal food, feed and fodder by the poor, especially rural women and children
3. **Increased consumption** of nutritious dryland cereals by the poor, especially among nutritionally vulnerable women and children
4. **Increased and more equitable income** from marketing dryland cereal grain, fodder and products by low income value chain actors, especially smallholder women farmers
5. **Increased capacity to adapt to environmental variability and longer term changes** in low income communities in Africa and Asia

## IDO TARGET (IMPROVED PRODUCTIVITY)

- Yield (grain & stover) in farmer fields
- Profitability

**Improved productivity** of dryland cereals in smallholder farming systems in Africa and Asia

- 30-40% increase in sorghum grain yield in 600,000 farmer fields in WCA and ESA, of which 50% of the increase is in women farmers' fields
- 20-30% increase in pearl millet grain yield in 800,000 farmer fields in WCA and ESA, of which 50% increase in women farmers' fields
- 20-30% increase in barley yield in 300,000 farmer fields in Ethiopia, India, Iran, Kazakhstan, Morocco
- 15-20% increase in pearl millet and sorghum grain and 5-10% stover yield in 3 million ha in India
- 30-50% increase in finger millet grain yield in 300,000 farmer fields, and 20% increase in premium quality marketable grain in Ethiopia, Tanzania and Uganda
- 10-20% increase in profitability of sorghum for industrial use in Nigeria, Kenya and Tanzania; 15-25% increase in profitability of barley for industrial use in Ethiopia, India, Iran and Morocco



## IDO TARGET (INCREASED & STABLE ACCESS TO PRODUCTS)

- ❑ Price, availability in the market
- ❑ Household stocks throughout the year

**Increased and stable access to** dryland cereal food, feed and fodder by the poor, especially rural women and children

- 50% decrease in the length of the hunger period for 500,000 rural poor households producing sorghum and pearl millet in Mali, Niger, Nigeria and Burkina Faso
- 20% increase in the stock of finger millet prior to harvest period for 250,000 rural poor households producing finger millet in Ethiopia, Tanzania and Uganda
- 20% increase in the availability of food barley (grain), feed barley (grain and straw) and industrial use at more stable market prices in CRP focal countries.
- 15-20% reduction in price volatility (measured by CV in price) influenced by stable supply of pearl millet and sorghum in India

## IDO TARGET (INCREASED CONSUMPTION OF NUTRITIOUS DRYLAND CEREALS)

- Iron and zinc content (finger millet, pearl millet, sorghum), calcium (finger millet)
- Diet diversity towards dryland cereals

**Increased consumption** of nutritious dryland cereals by the poor, especially among nutritionally vulnerable women and children

- 30-50% increase in iron and zinc intake levels from nutrient-dense pearl millet by women and children in WCA and ESA, and in areas where high iron hybrids were adopted in India
- 30-50% increase in iron and zinc intake levels from nutrient-dense sorghum by women and children in WCA and ESA, and 15-20% increase in predominantly sorghum consuming population in India
- 30-50% increase in iron, zinc and calcium intake levels from nutrient-dense finger millet by women and children in Ethiopia, Kenya, Tanzania and Uganda
- 30% increase in consumption of finger millet, pearl millet and sorghum products in Ethiopia, Kenya, Sudan, Tanzania, Uganda and targeted areas in India, especially by women and children
- 10% increase in the use of iron and zinc fortified barley grain as food by nutritionally vulnerable women and children in rural and urban areas and for individuals with special dietary requirements in India, Iran, Ethiopia and Morocco

## IDO TARGET (INCREASED AND MORE EQUITABLE INCOME)

- Gender-disaggregated income and assets of farmers

**Increased and more equitable income** from marketing dryland cereal grain, fodder and products by low income value chain actors, especially smallholder women farmers

- 20-30% increase in income for pearl millet and sorghum growers and processors in target regions of India, with 15-20% of the income by women growers and processors
- 25% increase in income by finger millet, pearl millet and sorghum growers and processors in Burkina Faso, Mali, Nigeria, Ethiopia, Kenya, Tanzania and Uganda, with 35% of the income by women processors
- 20% increase in income of barley growers from industrial uses in Ethiopia, India and Iran with 20% of the income by women processing barley for local food and other industrial uses in Ethiopia, India, Iran and Morocco

## IDO TARGET (INCREASED ADAPTATION TO ENVIRONMENTAL VARIABILITY)

- Cultivar diversity
- Crop management

**Increased capacity to adapt to environmental variability and longer term changes** in low income communities in Africa and Asia

- 20% decrease in acreage of dryland cereals fields requiring re-sowing in WCA, ESA and India
- 25% reduction in acreage (and/or frequency) of failed dryland cereal crops in Africa and Asia
- Increase by at least one the number of cultivars grown by 400,000 pearl millet and sorghum farmers in WCA, 25% of the pearl millet and sorghum farmers in Ethiopia, Sudan and Tanzania and 100,000 pearl millet farmers in India, 30% of the finger millet farmers in Ethiopia, Tanzania and Uganda
- 150,000 households in India adopting improved sorghum cultivars and management practices to mitigate environmental variability
- 5% of barley acreage is grown using enhanced water productivity technologies in rotation with legumes and with conservation agriculture practices in Ethiopia, Iran, India and Morocco.

## GENDER-SPECIFIC OBJECTIVES

- Obtain gender-disaggregated data and gender sensitive analyses on dryland cereal value chains
- Develop improved cultivars with traits that create market opportunities that especially benefit women
- Increase “whole plant value” for primary producers, mainly women, of these crops
- Develop crop management interventions that are appropriate for women
- Increase women farmers' access to seed of new dryland cereal varieties
- Enhance womens' benefit from agro-enterprise opportunities, not just from the reduction of drudgery
- Proactively involve more women in participatory research-for-development, training and knowledge-sharing activities

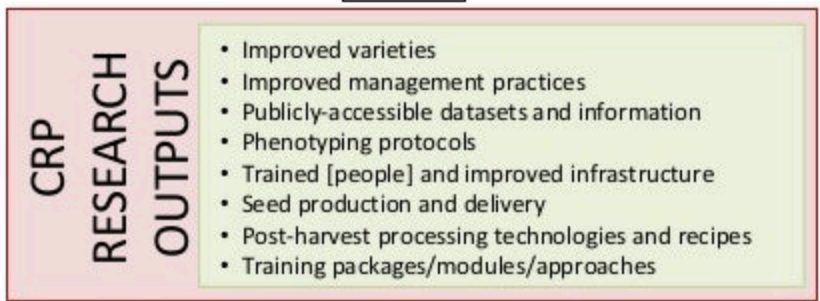
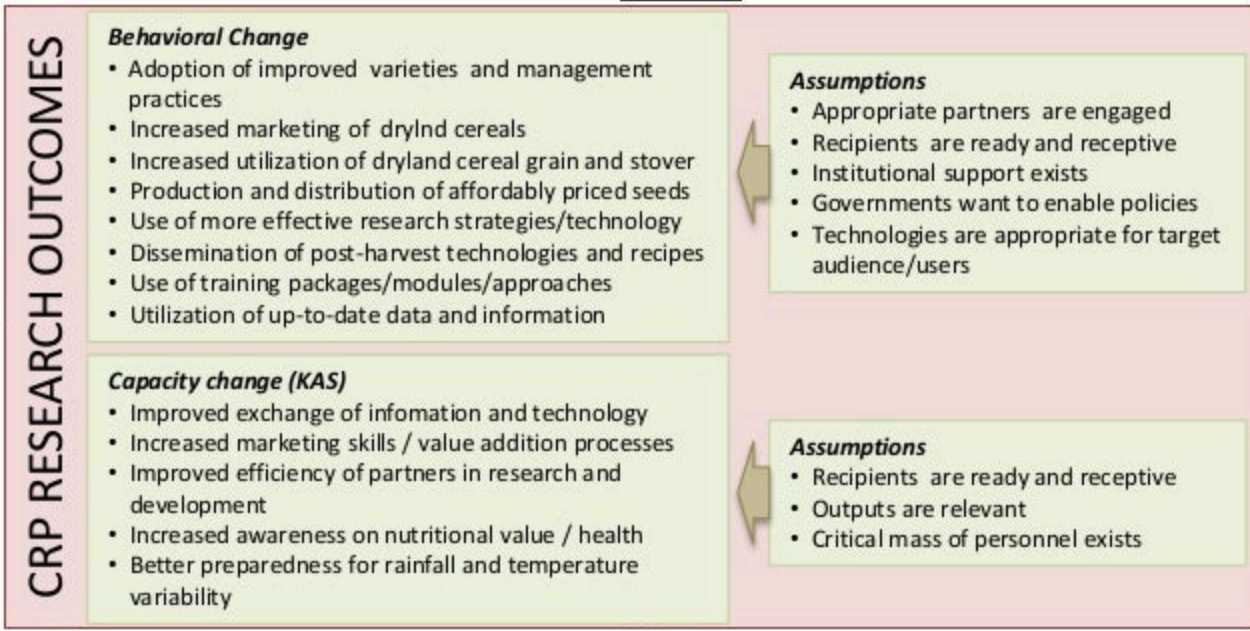
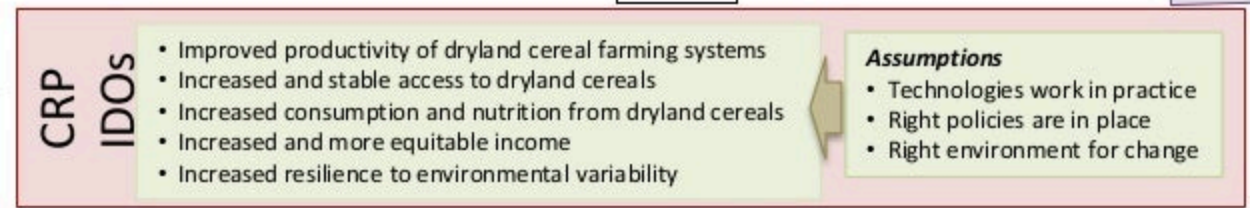
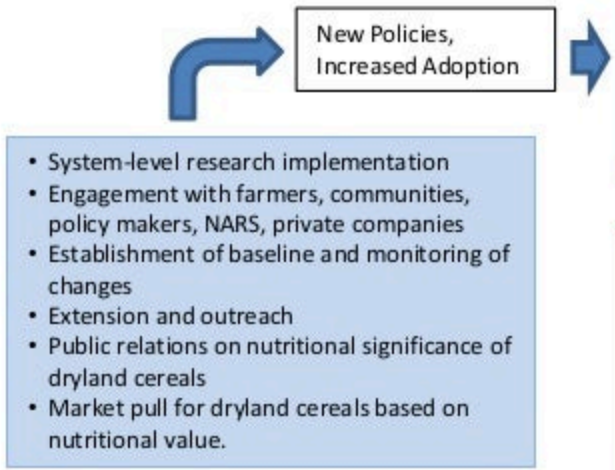
*Interviewing mothers about desirable quality traits of sorghum breeding lines*



# Generic Theory of Change



Natural Events, Policies, Consumer Preferences, Economic Trends



## Implementation Theory

## Programme Theory

# STRATEGIC PARTNERSHIPS



BILL & MELINDA  
GATES foundation



Sorghum & Millet  
Innovation Lab

- Collaborative Research
- Collaborative Development
- Training
- Capacity Building
- Infrastructure Development
- Extension
- Seed/Technology Dissemination
  
- Partner Involvement in Management and Oversight of CRP
  - Steering Committee membership
  - Research Management Team Membership
  - Flagship Project (Product Line) Co-ordinators



>70

Programs in Africa &  
Asia

15

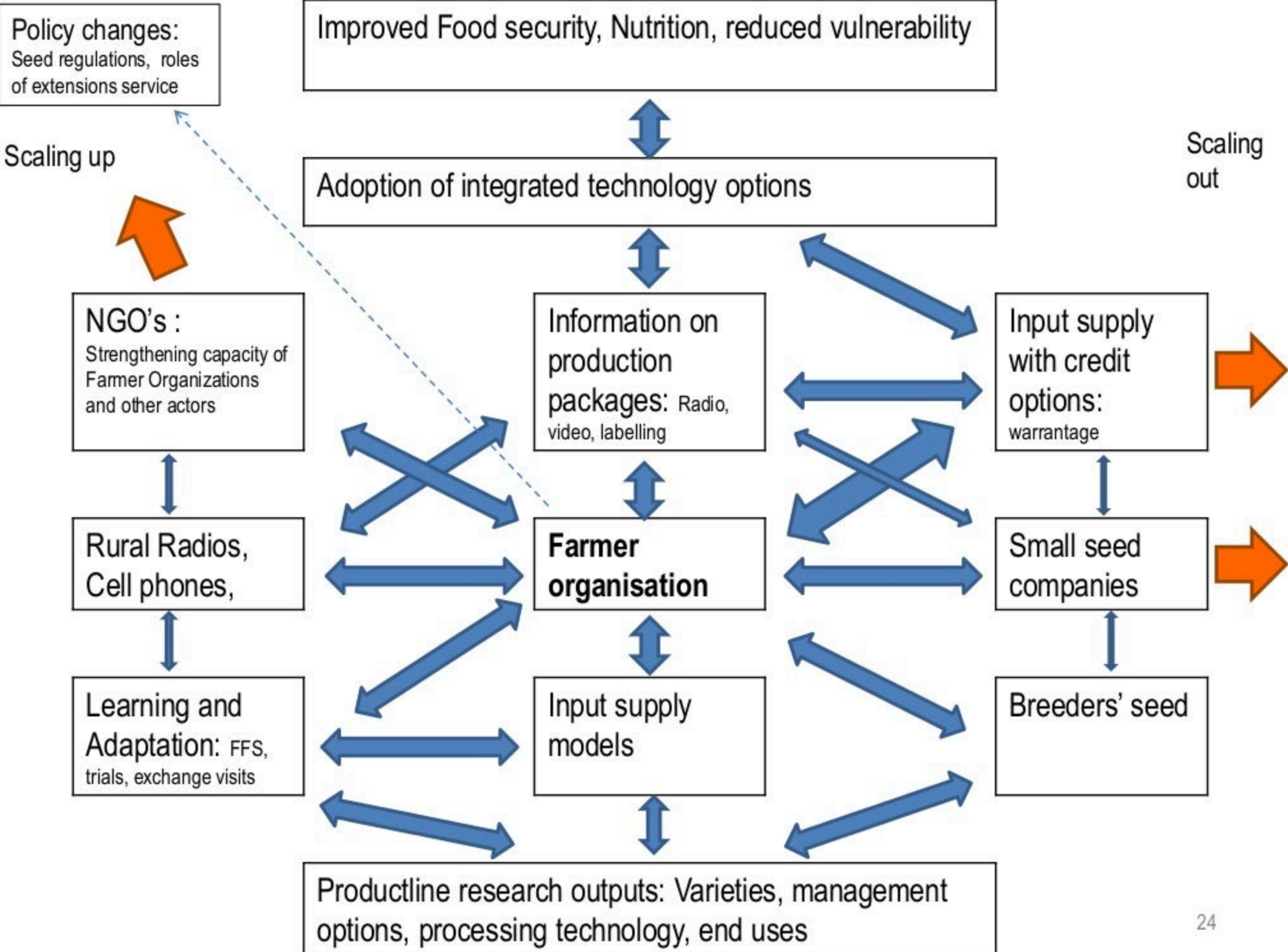
Advanced Research  
Institutes

20

NGOs, CSOs &  
Farmer Organizations

30

Private Sector  
Companies





## PARTNER ROLES TOWARDS PL1 OUTPUTS & OUTCOMES: an example

Farmer Unions, specialised NGOs: access agriculture (video), Afrique Verte (cooperatives);  
Private sector: Rural Radio stations; awhere; agrobase; Kbioscience;  
GCP, Harvest Choice, Impact Assessment specialists (MSU, ..) , CORAF

**SC1** Assembling and making accessible data and knowledge

**SC2** Developing improved dryland cereal varieties and hybrids

**SC3** Integrating sustainable crop, pest and disease management options

**SC4** Promoting effective seed dissemination

**SC5** Promoting post-harvest value addition and market access

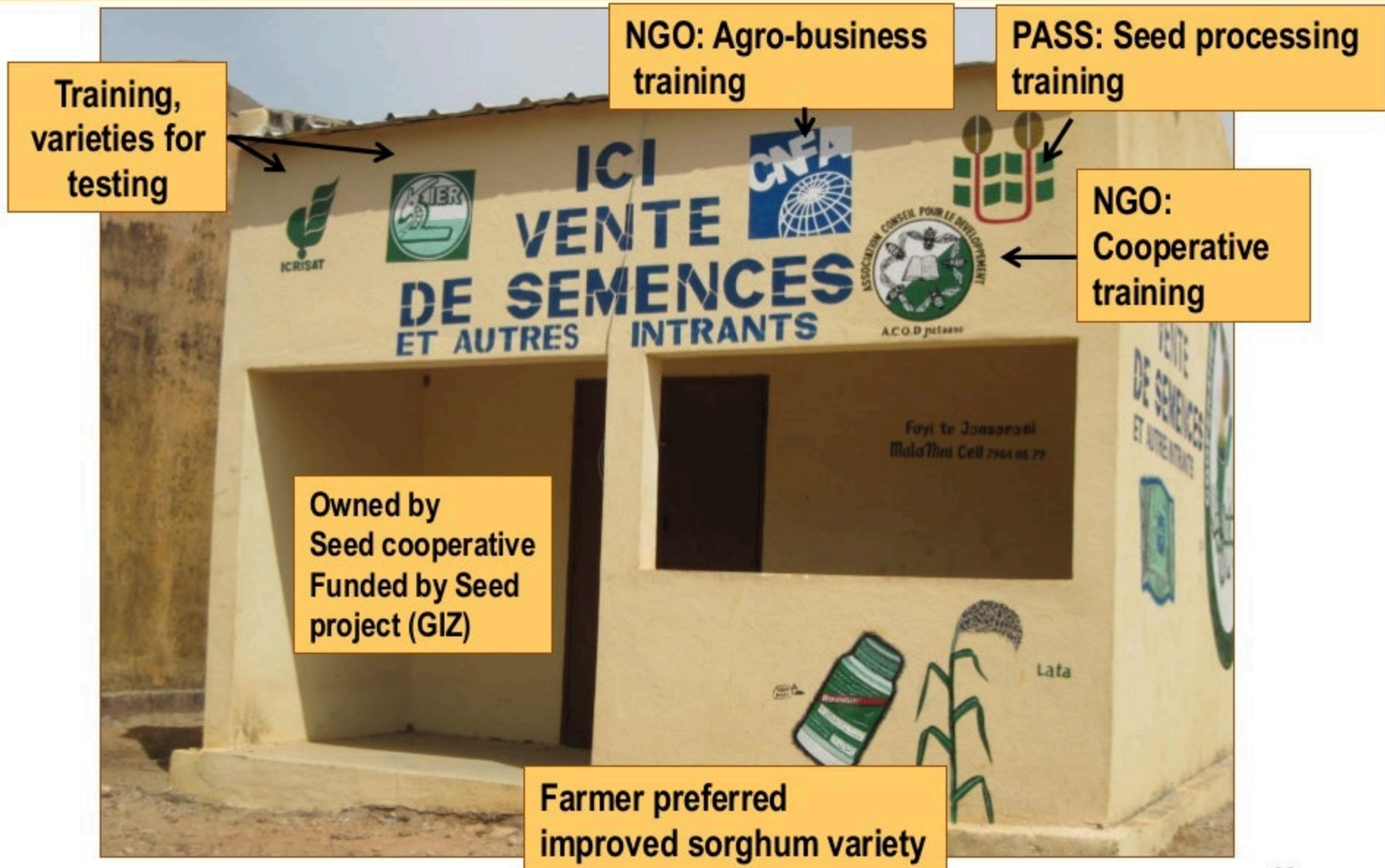
IER, INERA, IAR with Farmer organizations (e.g. ULPC, UGCPA); CIRAD, Univ. Hohenheim

NARS, WUR, CRS, AMEDD, AKF UACT, CBARDP

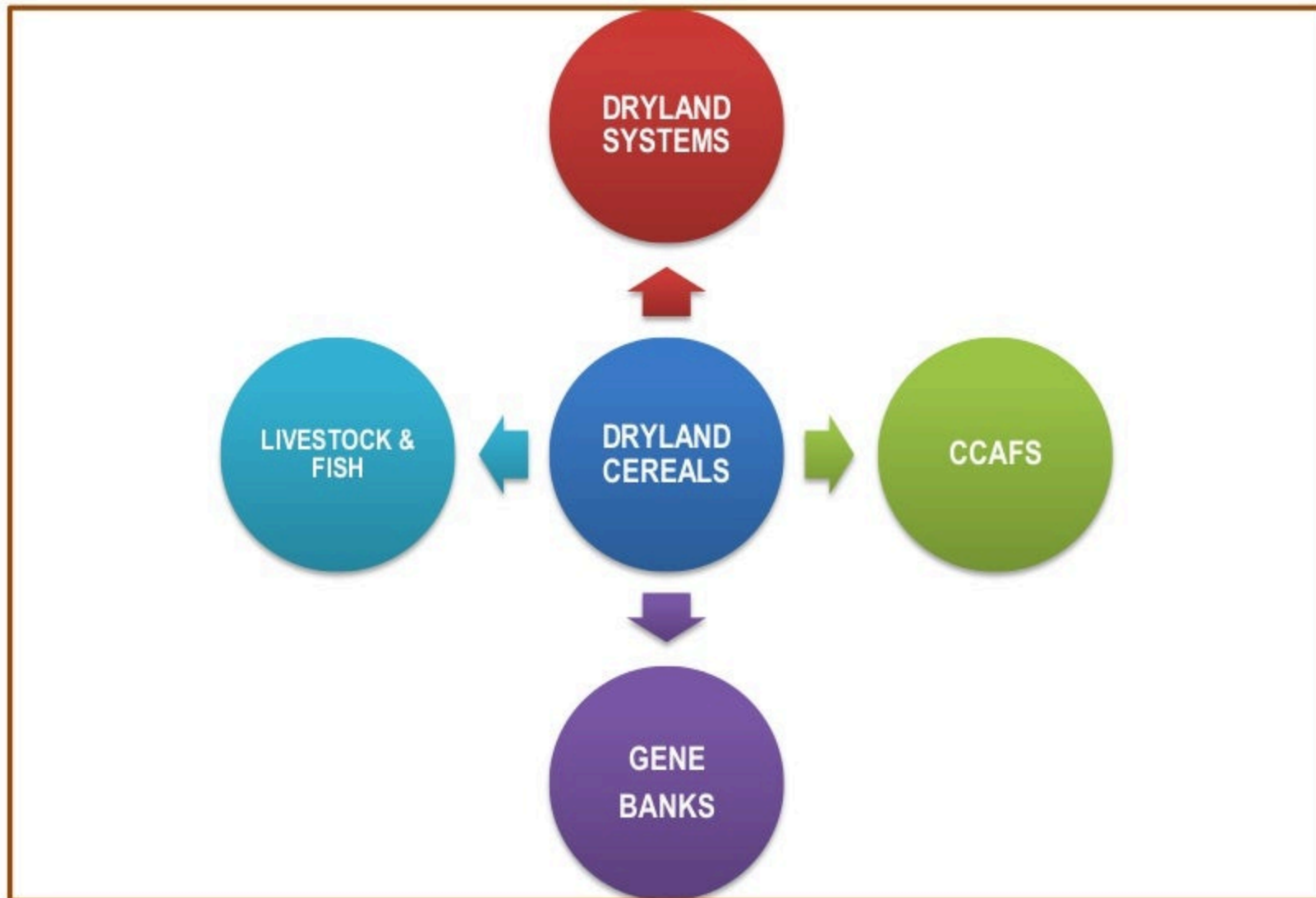
Farmer Coops, Seed companies (Faso Kaba, Comptoir 2000, AgriSahel) Seed regulators

Farmer Unions, IICEM, business incubator at ITA, IER; IRD, WUR processing

## SORGHUM IN WEST AFRICA: ONE PARTNERSHIP SUCCESS STORY



# LINKAGES WITH OTHER CRPs



# DRYLAND CEREALS & DRYLAND SYSTEMS

Integration and testing of system components  
Baseline data on HHs  
Systems typologies  
Gender disaggregation  
Participatory research  
System models  
Trade-off analysis

Genetic diversity and improvement of  
crop species in resource capture and  
use efficiency (N, P, H<sub>2</sub>O)  
Develop science of integrated crop  
management (IPM, IDM, NRM)  
technologies

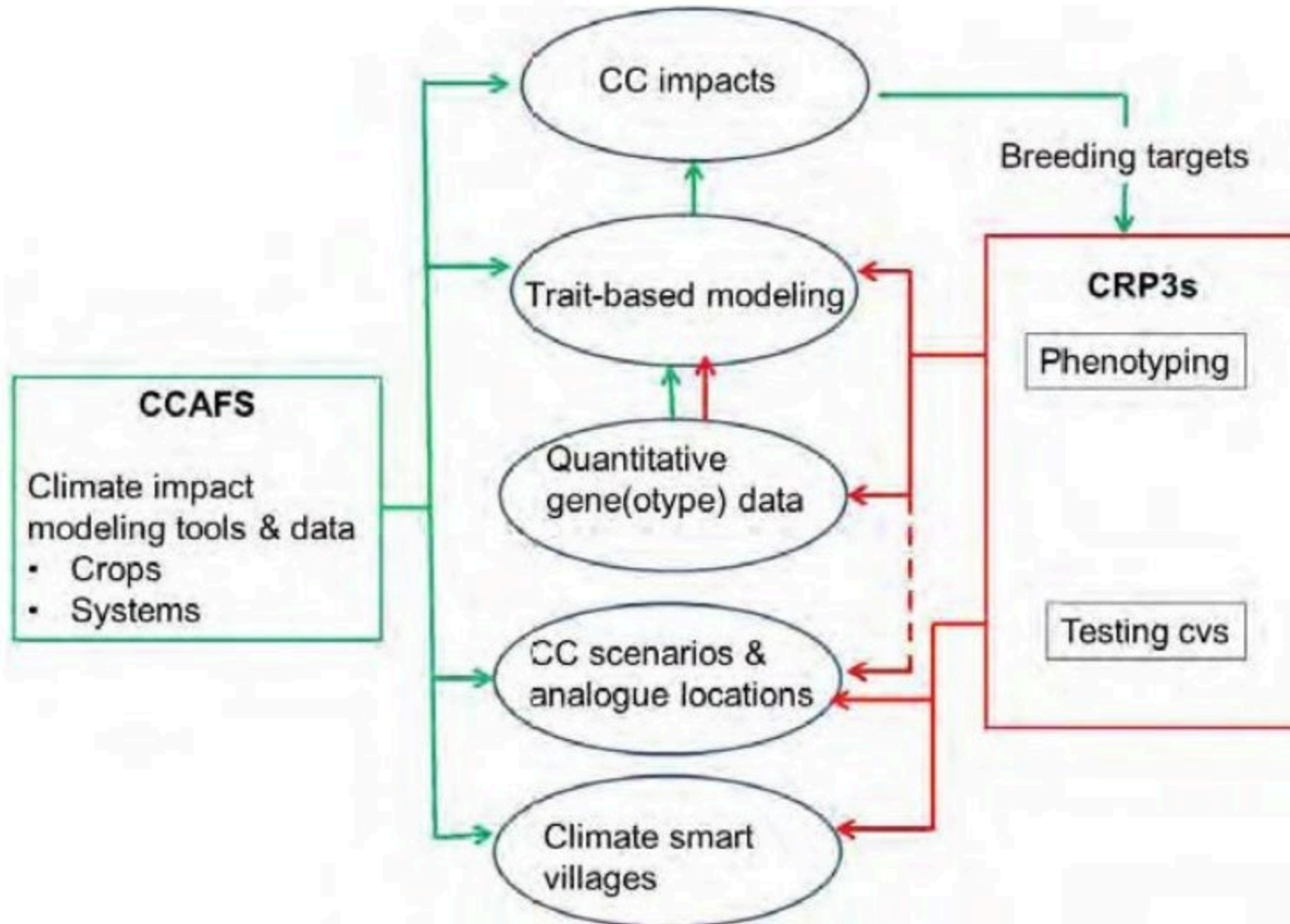
Feedback to CRPs for priority setting &  
design of products or technologies

Joint activity in CRP1.1 action sites

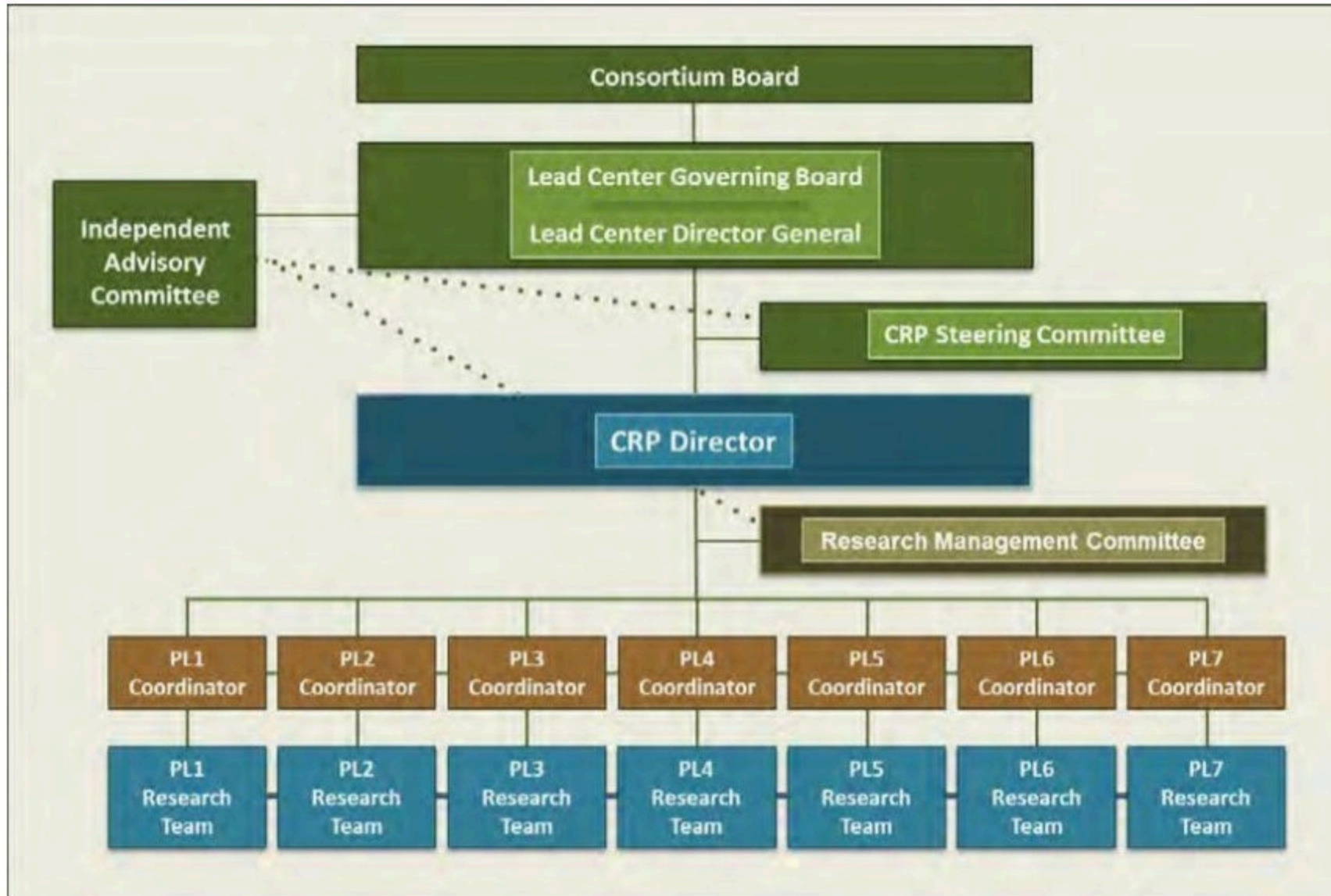
Testing

- Cultivars and adaptation in different systems
- Integrated crop management (IPM, IDM, NRM) technologies

# DRYLAND CEREALS & CCAFS



# GOVERNANCE AND MANAGEMENT





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A large, semi-transparent image of various cereal grains, including sorghum, millet, and rice, arranged in a fan-like pattern against a light background. The grains are in various shades of brown, tan, and grey.

# THANK YOU!



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LED BY



IN PARTNERSHIP WITH



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governments, and farmers worldwide