

Under standing the political economy of dynamic complex agri-food systems

Gideon Kruseman (CIMMYT)
Utrecht University, December 3, 2018

Overview

- Brief intro on CIMMYT
- Brief Intro on SEP
- The Issue of dynamic complex agri-food systems
- Question



CIMMYT Overview



Mission

Maize and wheat science for improved livelihoods.

Vision

A world with healthier and more prosperous people – free from global food crises – and more resilient agri-food systems.



The big impact

- Annual benefits of \$3.5-4 billion.
- 50% of maize and wheat in the developing world is based on CIMMYT varieties.
- Trained over 10,000 agricultural experts and scientists.



CIMMYT history

1950s ▼

OSS develops high-yield, disease-resistant, semi-dwarf wheat and shuttle breeding



1970s ▼

Norman Borlaug is awarded the Nobel Peace Prize



2000s ▼

CIMMYT scientists win the World Food Prize



1940s ▲

The Office of Special Studies (OSS) is created



1960s ▲

The Green Revolution in India and Pakistan

CIMMYT is officially founded



1980s/1990s ▲

The Wellhausen-Anderson Plant Genetic Resources Center opens



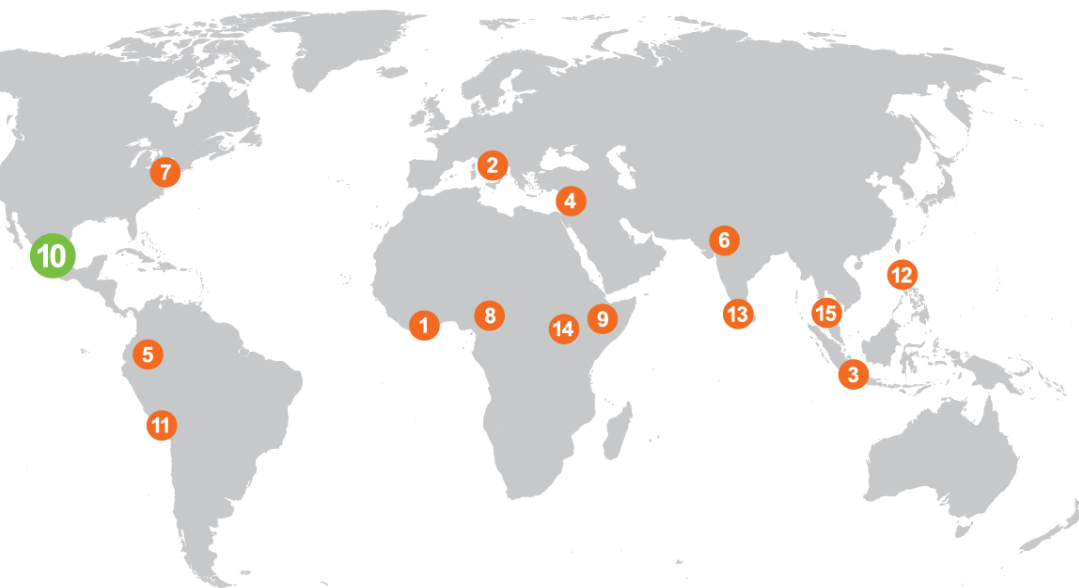
2016 ▲

CIMMYT launches new strategy with focus on nutrition and livelihoods.



CGIAR research centers

CIMMYT is one of 15 CGIAR members in 65 countries, in close collaboration with hundreds of partners.

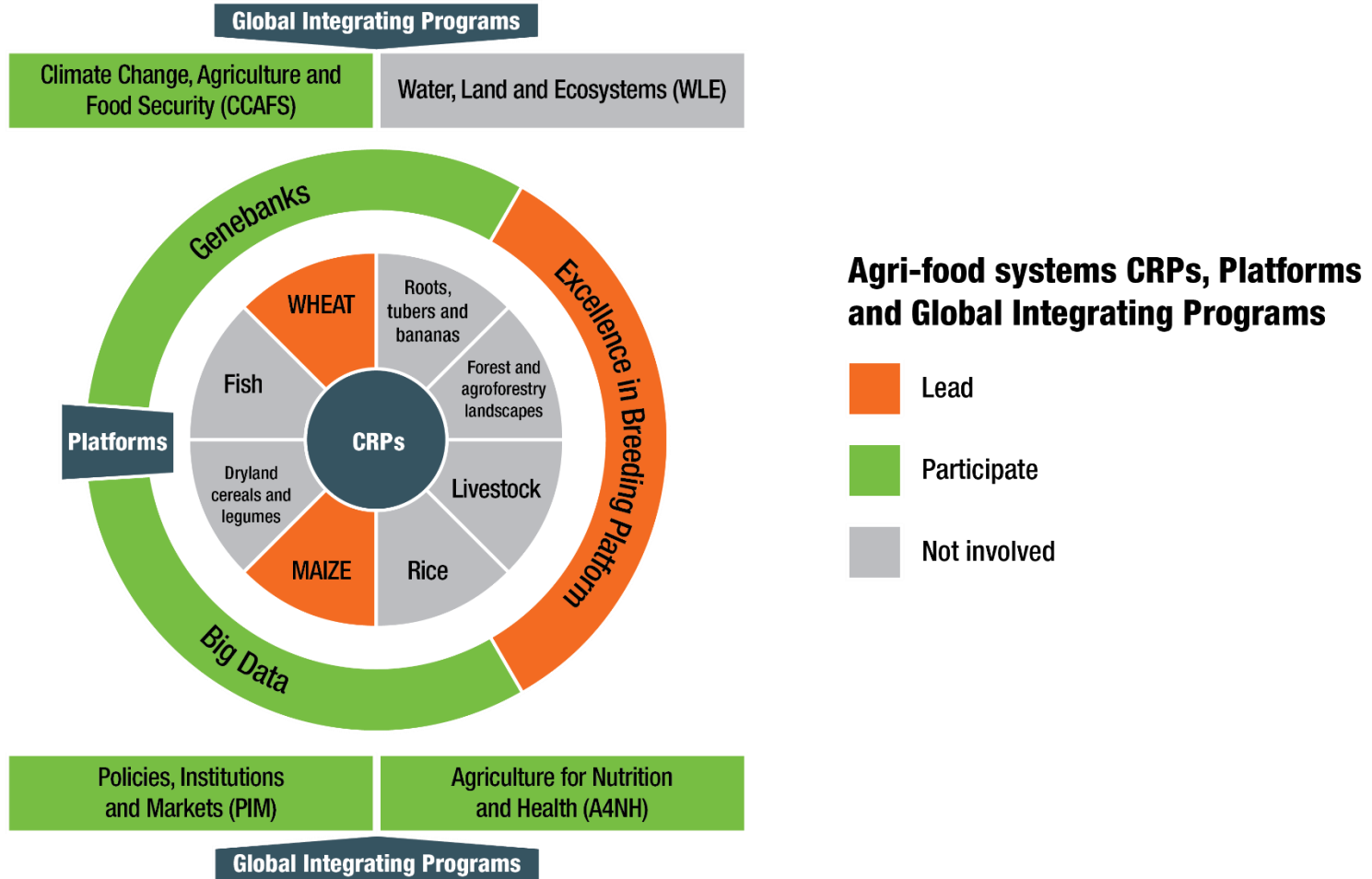


Centers

- 1 AfricaRice
- 2 Bioversity International
- 3 Center for International Forestry Research (CIFOR)
- 4 International Center for Agricultural Research in the Dry Areas (ICARDA)
- 5 International Center for Tropical Agriculture (CIAT)
- 6 International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)
- 7 International Food Policy Research Institute (IFPRI)
- 8 International Institute of Tropical Agriculture (IITA)
- 9 International Livestock Research Institute (ILRI)
- 10 International Maize and Wheat Improvement Center (CIMMYT)
- 11 International Potato Center (CIP)
- 12 International Rice Research Institute (IRRI)
- 13 International Water Management Institute (IWMI)
- 14 World Agroforestry Center (ICRAF)
- 15 WorldFish



CIMMYT and CGIAR

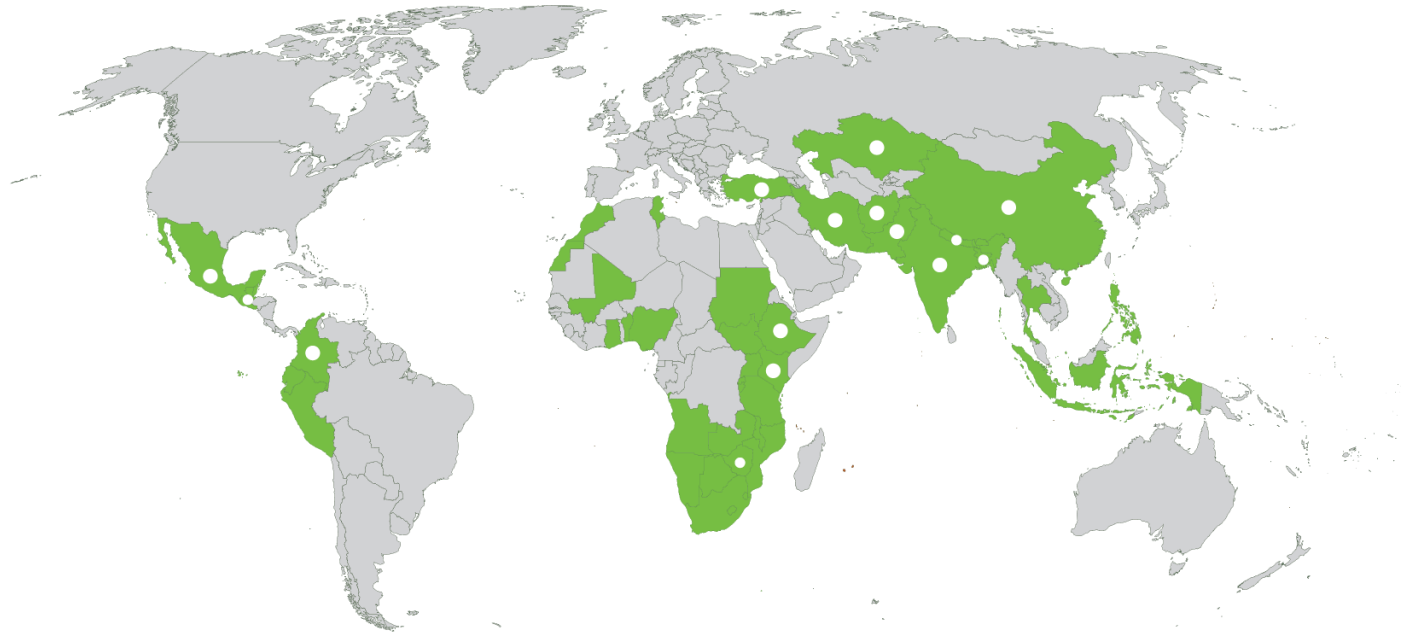


CIMMYT around the world

1,200 staff from over 50 countries!

Countries with offices:

Afghanistan
Bangladesh
China
Colombia
Ethiopia
Guatemala
India
Iran
Kazakhstan
Kenya
Mexico
Nepal
Pakistan
Turkey
Zimbabwe



 Projects in over 40 countries

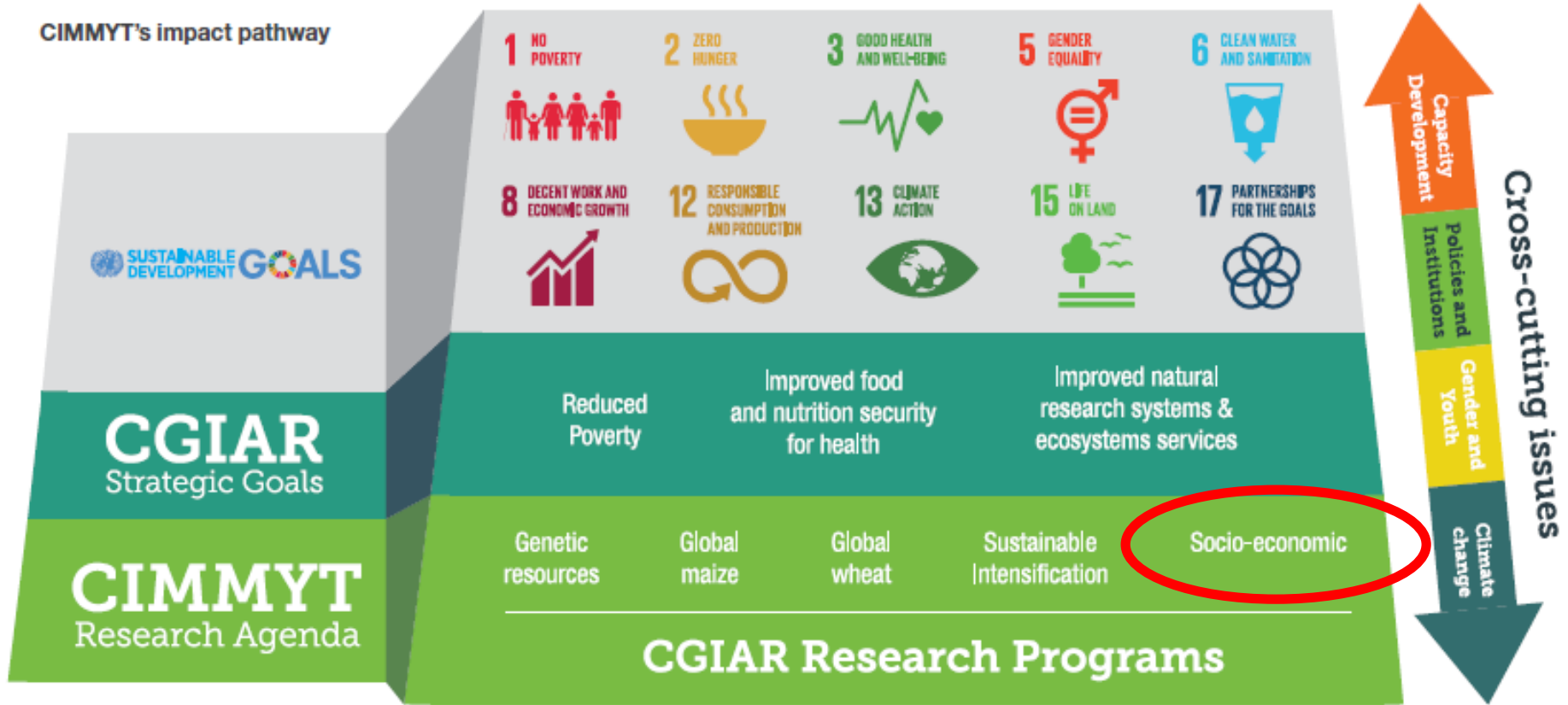


CIMMYT-SEP

Overview



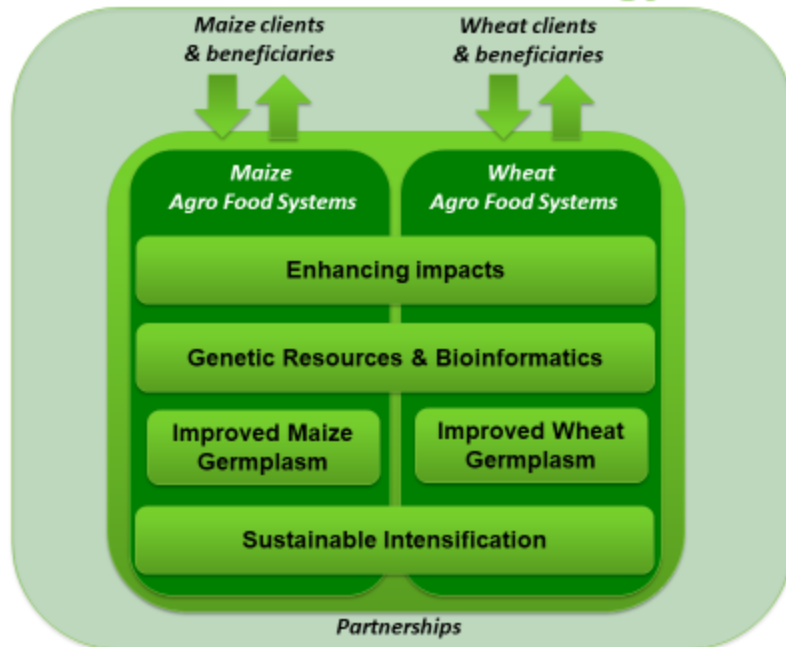
SEP within the CIMMYT impact pathway



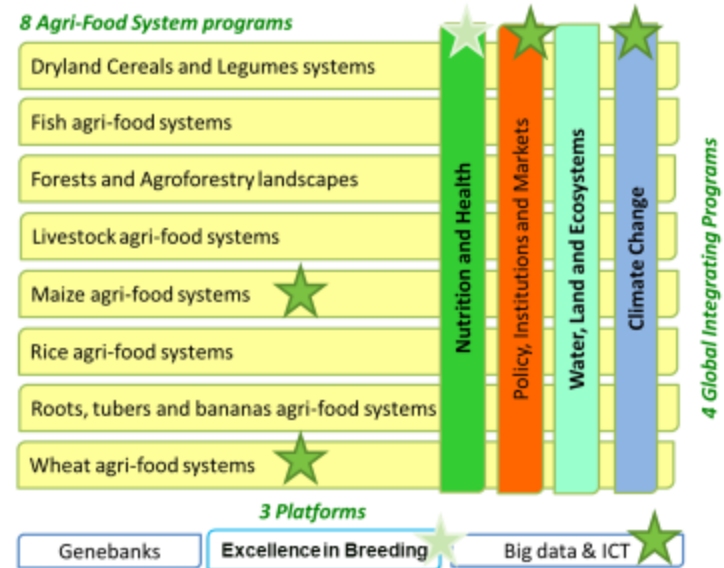
Multi-disciplinary collaboration

- SEP as disciplinary home
 - Diverse social science research approaches & expertise
 - Not only economists!
 - Collaboration with all CIMMYT research programs and several CRPs

CIMMYT R4D strategy



CGIAR Portfolio 2017+



SEP engagement: ★

Rationale & objectives

SEP aims:

- to enhance effectiveness interventions in maize & wheat agri-food systems through
- improved prioritization, targeting, understanding and social inclusiveness
- providing practical and actionable (policy) recommendations

SEP thereby:

- helps improve use of scarce R4D resources
- accelerates uptake of wheat & maize innovations
- enhances their impact and social inclusiveness for poor producers & consumers
- with a focus on Africa, Asia & Latin America.



What we do?

Research-for-development (R4D)

- *Not* purely academic research
- *Not* purely development
- Maize/wheat based agri-food systems (AFS)
- Multi-disciplinary, collaborative

Enhance CIMMYT's impact by:

- providing necessary guidance (priorities, implications),
- reality check whether interventions are worth the money
- learning

while keeping an eye on

- the **big picture** & micro-level implications
- the changes transforming agriculture & rural landscapes
- potential opportunities/threats & game changers
- objectivity, incl potential likelihood of success/failure



Research themes & program structure

Aligned with MAIZE & WHEAT FP1

1. Foresight & targeting
 - Establishing priorities
2. Adoption & impacts
 - Understanding & learning
3. Gender & social inclusiveness
 - Moving towards greater inclusiveness & equity
4. Markets & value chains
 - Identifying opportunities

Aligned with MAIZE & WHEAT FP4

5. Integrated systems & process research

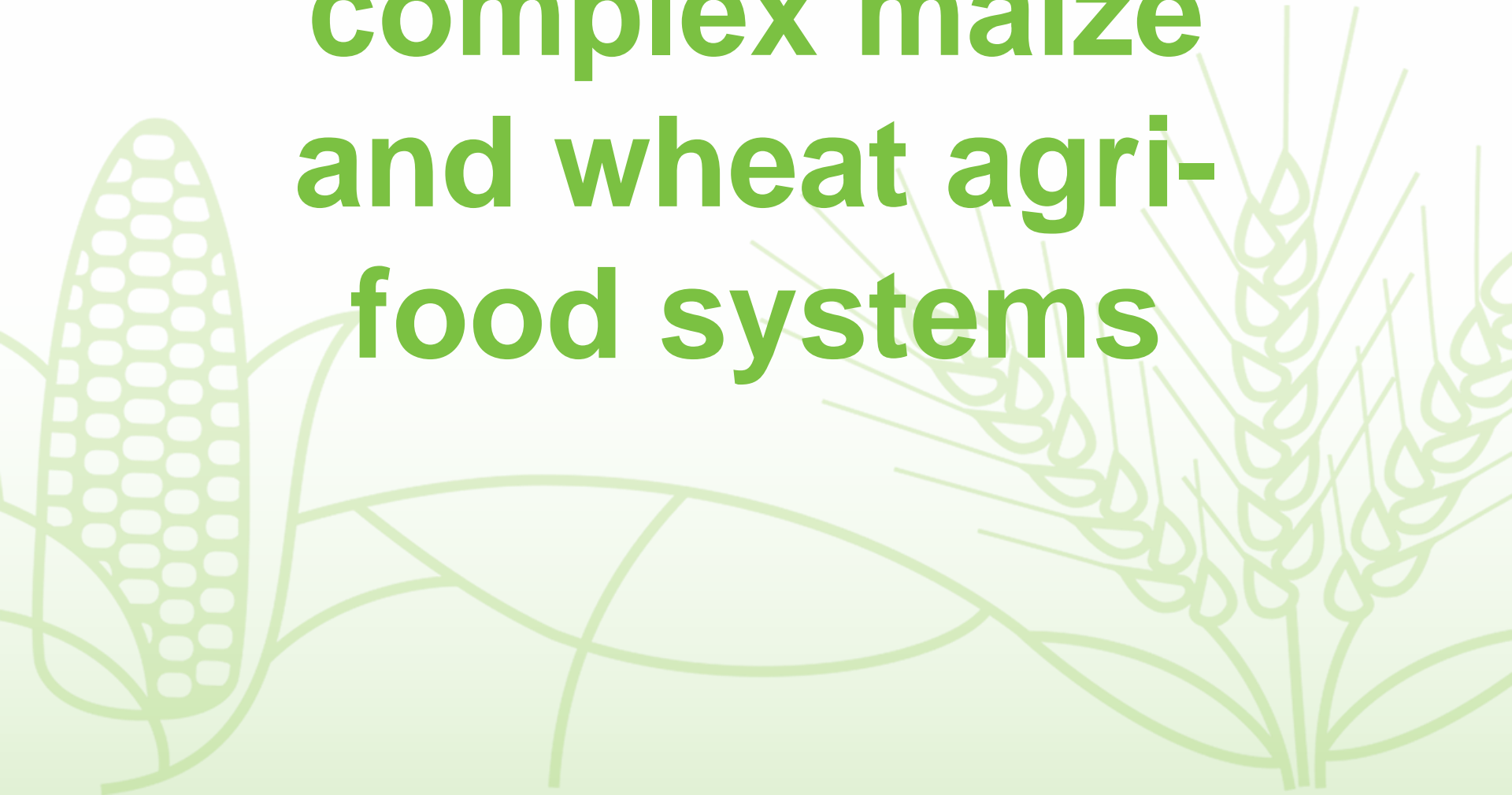


OUR PEOPLE (SEP - IRS)

Mid-2018



Dynamic complex maize and wheat agri- food systems



Agri-Food Systems

INDIVIDUALITY: Multilevel but usually driven by decentralized, local interaction of constituent parts. Each level is composed of autonomous actors who adapt their behavior individually.

HETEROGENEITY: Substantial diversity among actors at each level — in goals, rules, adaptive repertoire, and constraints — can shape dynamics of the system.

INTERDEPENDENCE: Usually contain many interdependent interacting pieces, connected across different levels. System dynamics are often characterized by feedback and substantial nonlinearity.

EMERGENCE: Characterized by emergent, unexpected phenomena — patterns of collective behavior that form in the system are difficult to predict from separate understanding of each individual element.

(Hammond 2009)

Global Trade & Transport

Food DEMAND

shift^o



Drivers of change

- Climate change
- Population growth
- Overall economic developments

- Urbanization
- Lengthening of value chains
- Globalization

- Changing diets and food systems
- New and emerging pests and diseases
- Rural transformation
- Game changing technology from outside agriculture



Question for today



50 K grant

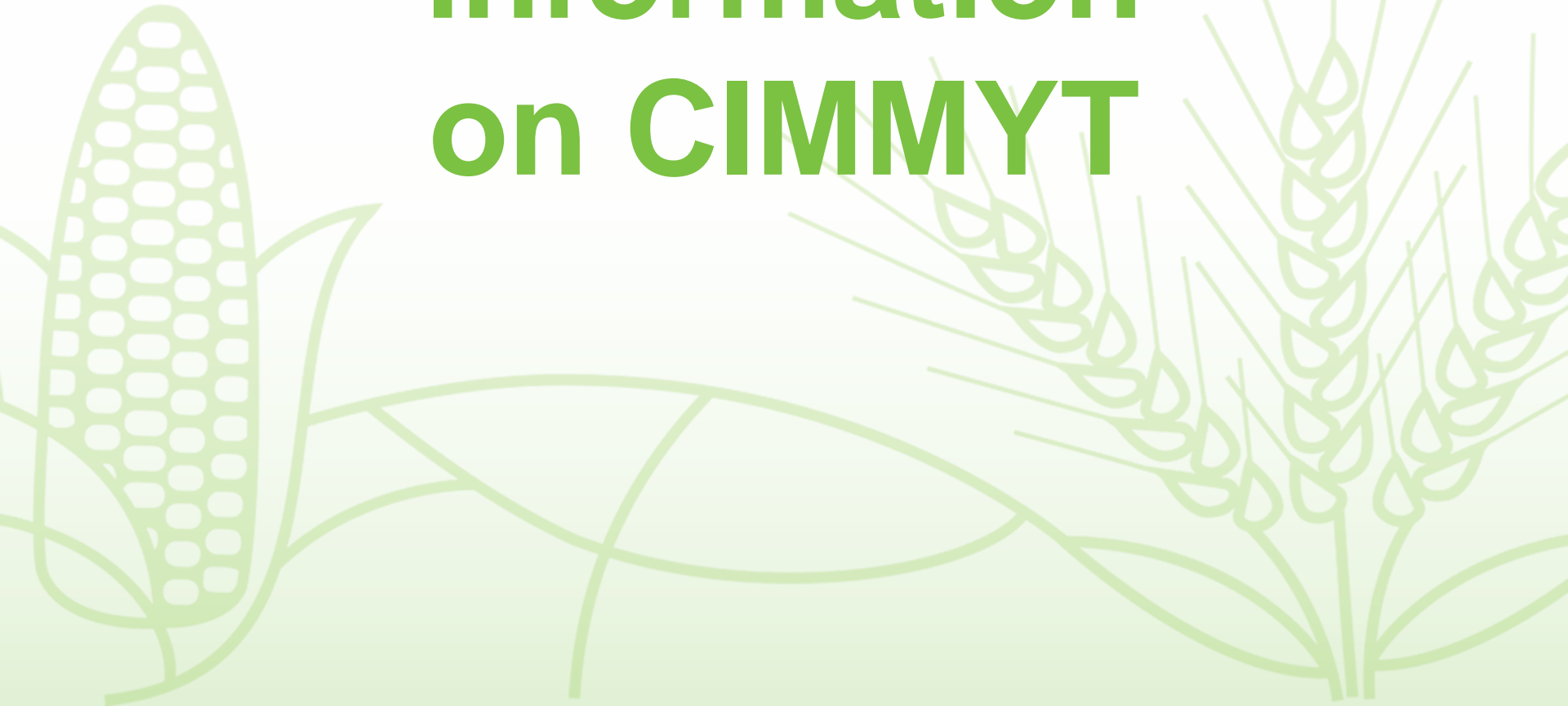
- We would like to scope the role of political economy in dynamic complex maize and/or wheat agri-food systems.
 - What does an agri-food system mean?
 - What are political economic implications of the concept of agri-food systems?
 - In relation to:
 - *Nutrition and health*
 - *Rural – urban linkages*
 - *Policies, governance and institutions*
- Inter-disciplinarity





**Thank you
for your
interest!**

Extra information on CIMMYT



Wheat helps feed the world

WHEAT IS THE LARGEST
PRIMARY COMMODITY

GLOBAL PRODUCTION IS OVER
735 million metric tons



WHEAT PROVIDES **18%** OF OUR
TOTAL AVAILABLE CALORIES



2.5 billion people
in **89** countries



GROWN ON

220m 
HECTARES



\$27.8 billion
IN TRADE EACH YEAR



Maize helps feed the world

PREFERRED
STAPLE FOOD TO
900 million
people

LIVING ON LESS THAN \$2 A DAY



MAIZE PROVIDES
15-56% OF
TOTAL CALORIE INTAKE
in Sub-Saharan Africa, Latin America and Asia



184 million
hectares
WORLDWIDE

Global
production
in 2016 | **1026 million**
metric tons



\$21 billion
IN TRADE EACH YEAR



Integrated research agenda



Genetic diversity

- Conserve and use diverse maize and wheat collections
- Seed health
- Unlocking genetic potential



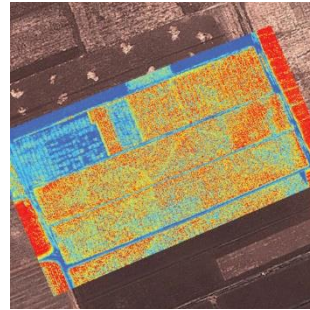
Develop and improve access to varieties

- Stress, disease and pest resilience breeding
- Molecular tools
- Developing seed sectors
- Nutritional and end-use quality



Farming systems

- Crop management practices
- Mechanization
- Participatory research



Increasing impact

- Social sciences
- Big data
- Gender and youth
- Foresight and impact assessments

CROSSCUTTING

Capacity development – Partnerships



CIMMYT strategy 2017-2022

Key global challenges

- Population growth
- Food and nutritional insecurity
- Environmental degradation
- Economic development
- Climate change



CIMMYT Strategy 2022 objectives

- A **sharp focus** on agri-food systems
- **More public-private partnerships**
- **CIMMYT academy**
- Apply **modern biotechnology techniques**.
- Breed **new maize varieties and hybrids** to replace old ones.
- Contribute to a **reduction in greenhouse gases**.
- Develop more **biofortified maize and wheat**.



Extra information on SEP research



SEP Research Theme:

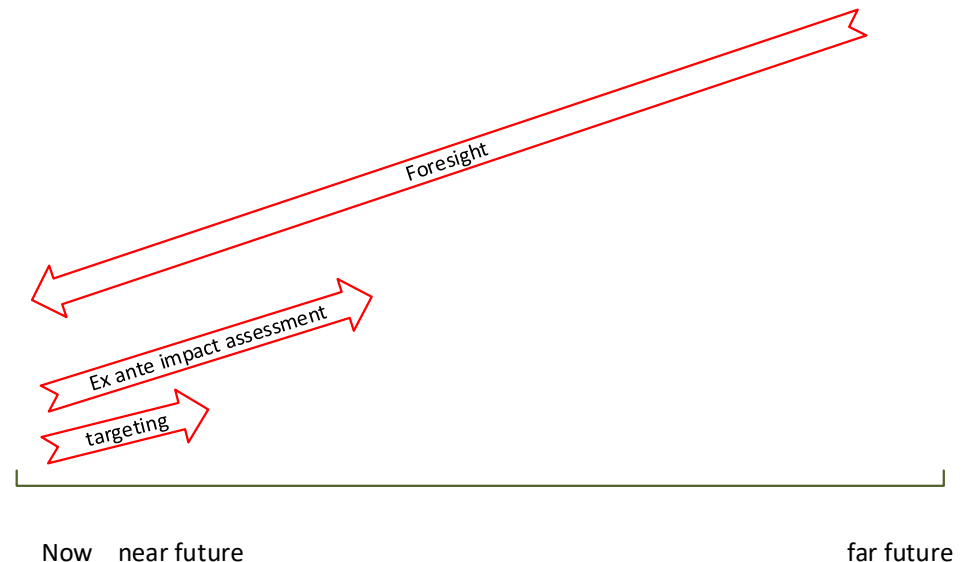
Foresight & Targeting

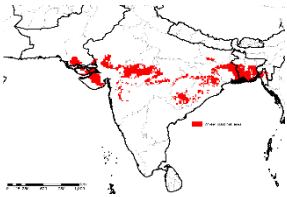


Some Definitions

Research theme on foresight and targeting

- **Foresight:** Looking into the crystal ball at the future to understand what it means for us today
- We define **ex-ante impact assessment** as the analysis at how pipeline technologies fit into farming systems and livelihood strategies and as the analysis of potential impact of research investments
- **Targeting** looks at short term questions of where, when, what and how of technology deployment



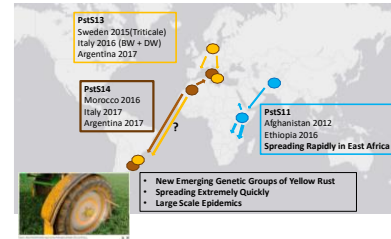


Threat of wheat blast to South Asia's food security: An ex-ante analysis
Mottaleb et al. 2018 Plos One

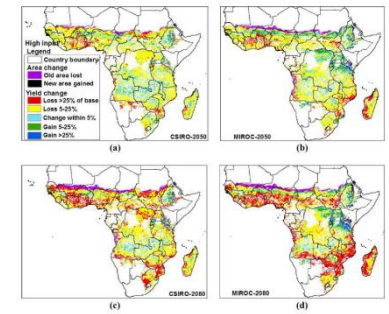
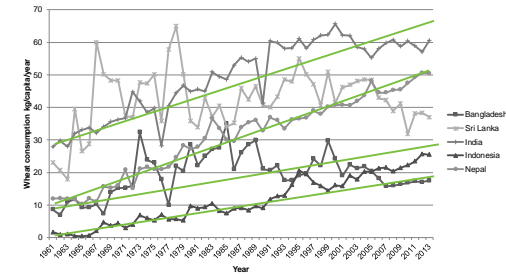
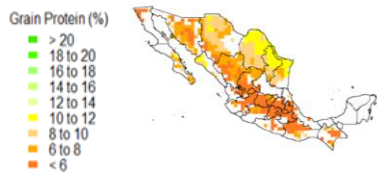
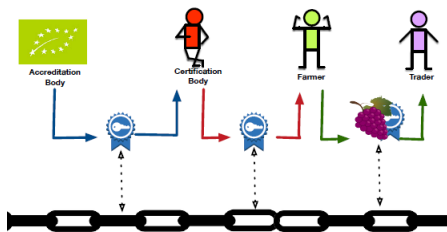
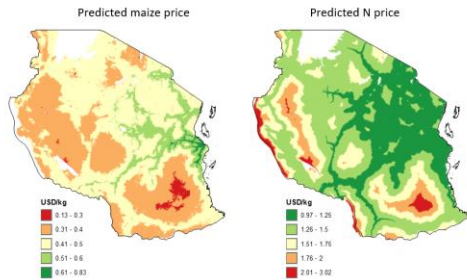
Key topics

Research theme on foresight and targeting

- Climate change
- New and emerging pests and diseases
- Changing diets and food systems
- Rural transformation
- Emerging technology outside agriculture
- Ex-ante IA of pipeline technologies
- Ex-ante IA of research investments
- Targeting for scaling

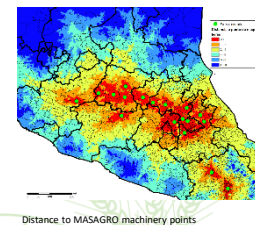


Estimate spatial price variation



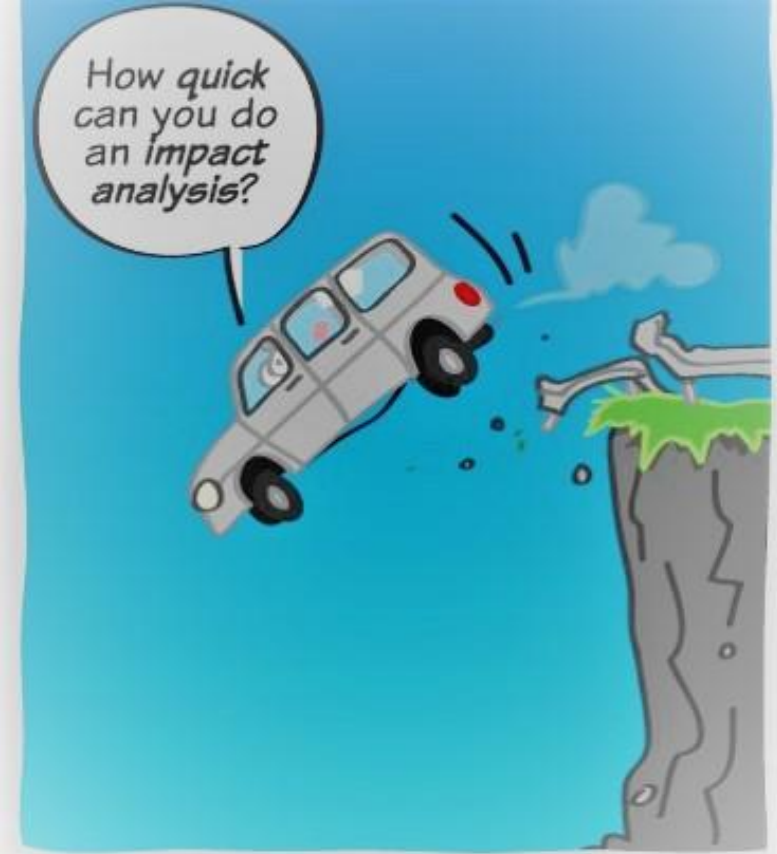
Maize systems under climate change

Figure 2. Changes in yield and area of maize under high N level in SSA by 2050 (a) and (b) and 2080 (c) and (d) relative to the baseline (2000) using climate projection from CSIRO (warmer, drier) and MIROC (warmer, wetter) GCMs under the A1B emission scenario

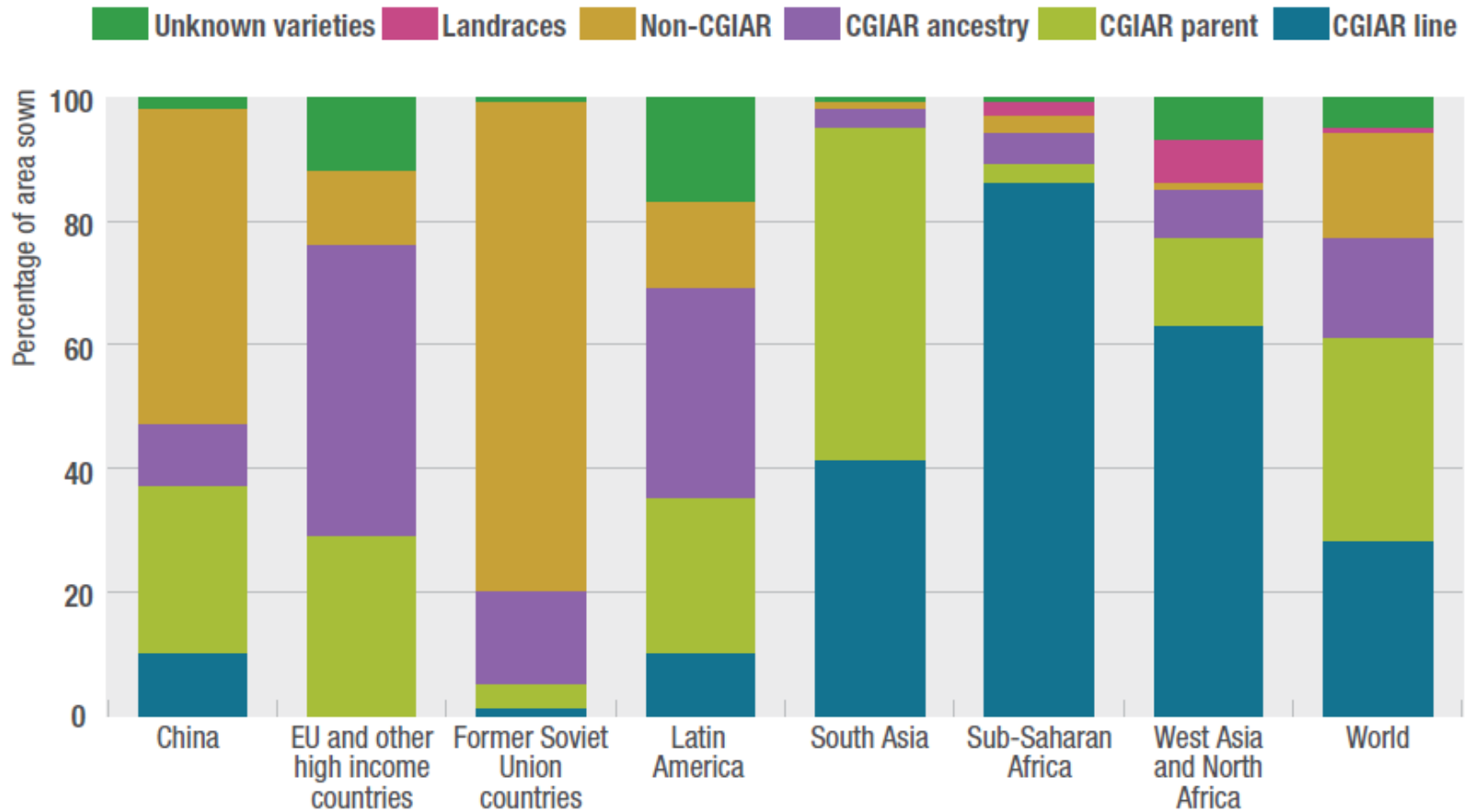


SEP Research Theme:

Adoption & Impacts



What do we do? Documenting the impacts



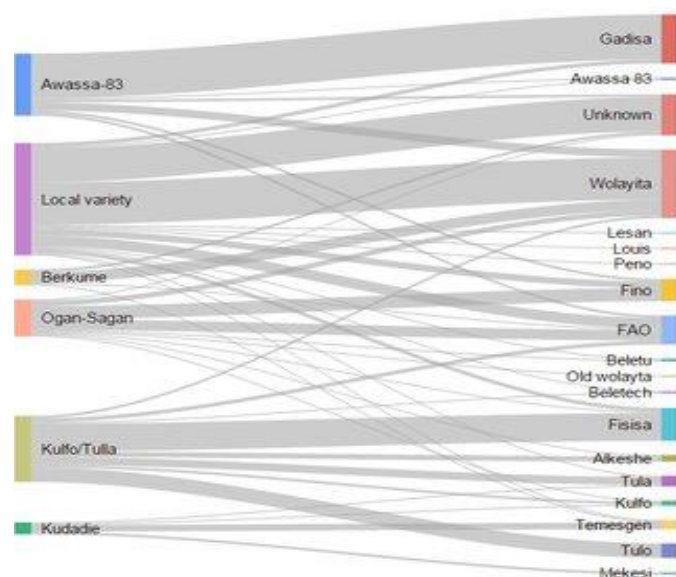
Spring bread wheat area shares (%) by origin of germplasm and region, 2014
(Lantican et al 2014)



Way forward (1): “What?” Questions

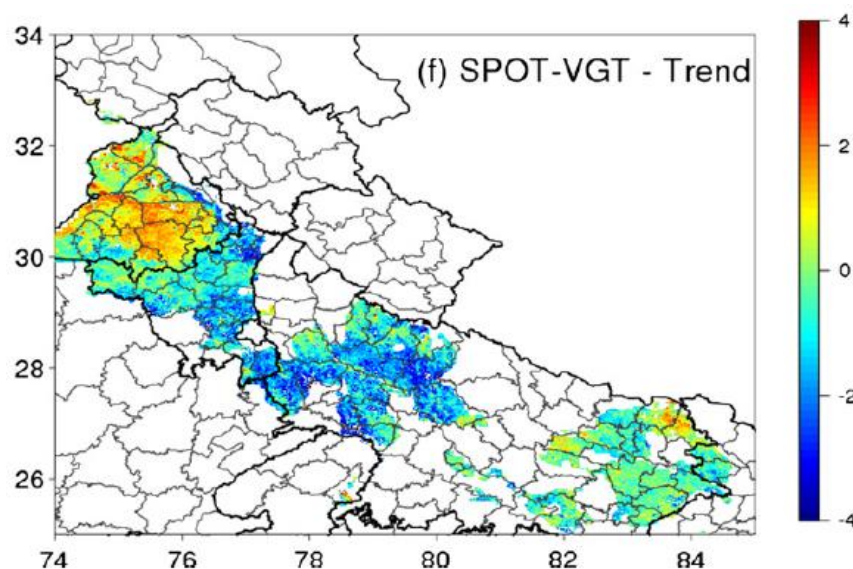
rigorous, objective, quick (ROQ) assessment

Better identification of cultivars (DNA fingerprinting)



Kosmowski et al. 2018. Sankey diagram

New approaches for data generation (Remote Sensing)



Lobell et al 2012. Detection of early sowing of wheat in India



Way forward (2): “How?” Questions

Looking at the process of change

- Understanding the process of change (adoption/impact pathways)
- Strengthening the “Learning” component of M&E&L
- New research questions (e.g., social inclusion, targeting)
- Integration of datasets across space and time
- Use of mixed methods (e.g., quantitative and qualitative)



SEP Research Theme:

Gender & social inclusiveness



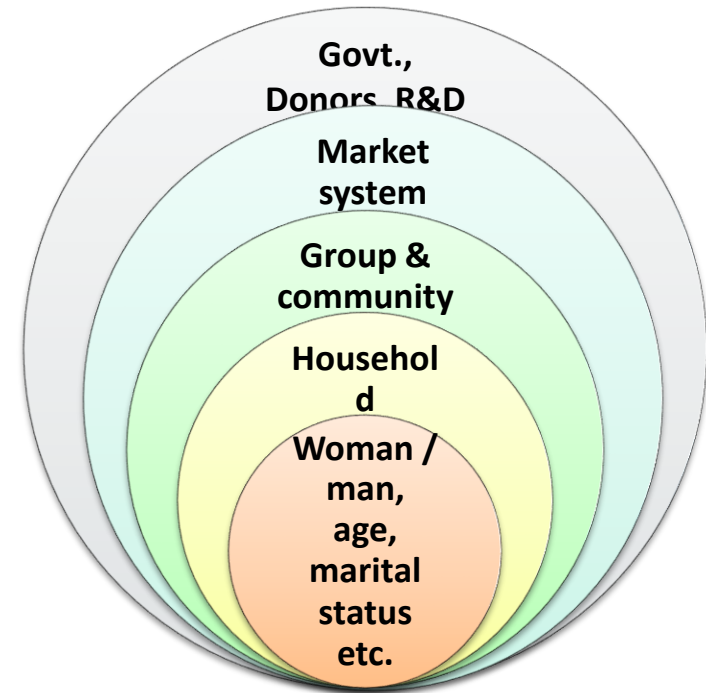
Gender & social inclusion

- Understanding *who* can engage with, access and benefit from maize- and wheat R4D

- ✓ Gender norms and agricultural innovation
- ✓ Maize-legume value chains
- ✓ Maize seed sector development
- ✓ Social inclusion action research – LatAm
- ✓ Methodological innovation – towards transformative approaches for inclusive AR4D
- ✓ Gender & social inclusion mainstreaming

- Cross-cutting issue

- Aim: CIMMYT R4D promotes equality of opportunity and outcomes



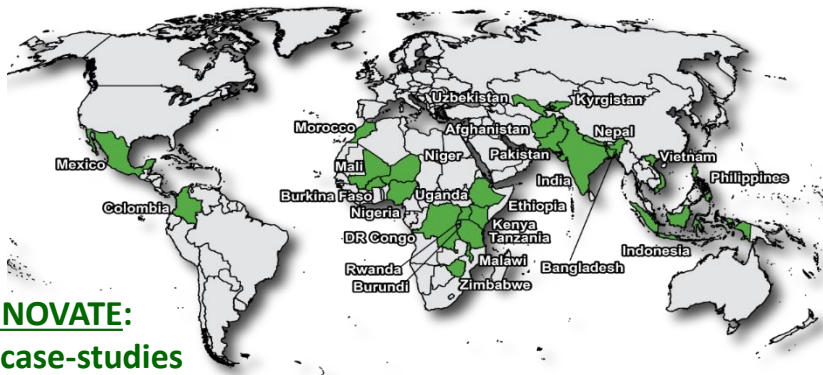
Social context: enables and constrains opportunities and outcomes differently, for different social groups

Maize- & wheat R4D
X
Gender and Social
Inclusion



contribute to
equality of
opportunity and

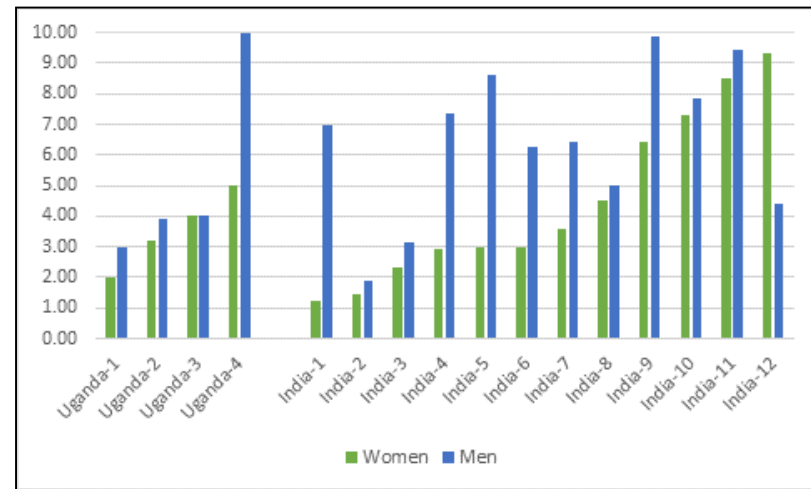
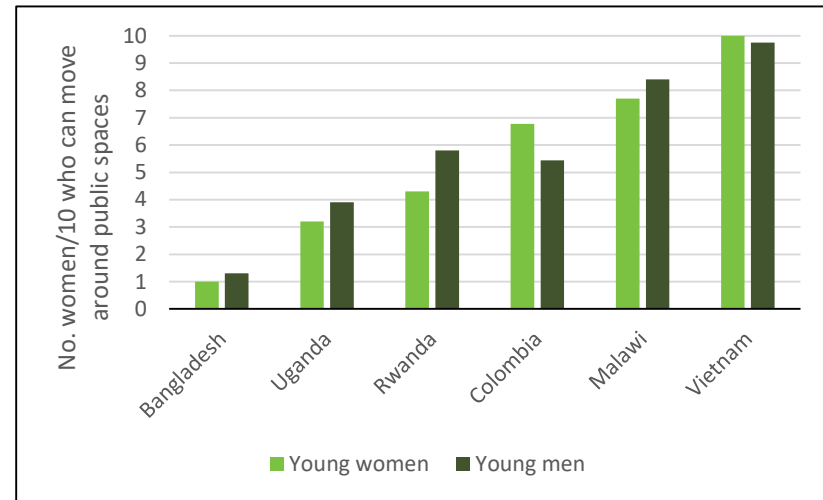




GENNOVATE:
137 case-studies
26 countries

Gender +

- Gender x cultural context
 - Variation across and within country
- Gender x age / lifecycle
 - Sense of agency increases with age
- Gender x marital status
- Gender x socio-economic status
 - Different levels of social tolerance



SEP Research Theme:

Markets & value chains



Areas of interest

1. Food systems
2. Value chains
3. Seed systems
4. Rural livelihoods



Food systems

Promoting better interventions for healthier diets

We examine:

- Consumer preferences
- Access to healthy food
- Processing and retail sectors
- Food safety

Looking ahead: A4NH collaboration, inputs to CIMMYT nutrition strategy, USAID engagement: “nutrition innovation in complex environments”



The image shows two overlapping document covers. The top one is from the journal 'Food Quality and Preference', published by Elsevier. The article title is 'Combining experimental auctions with a modified home-use test to assess rural consumers' acceptance of quality protein maize, a biofortified crop'. The authors are Hugo De Groote, Christine Kiria Chege, Keith Tomlins, and Nilupa S. Gunaratna. The bottom document is an IFPRI Discussion Paper (01732) titled 'The Role of Food Systems and Value Chains to Improve Diets in Low Income Settings: Diagnostics to Support Intervention Design in Malawi', dated June 2018, by Aulo Gelli, Jason Donovan, Amy Margolies, and Noora Aberman.

Contents lists available at [ScienceDirect](#)

Food Quality and Preference

ELSEVIER journal homepage: www.elsevier.com/locate/foodqual

Combining experimental auctions with a modified home-use test to assess rural consumers' acceptance of quality protein maize, a biofortified crop

Hugo De Groote^{a,*}, Christine Kiria Chege^{b,1}, Keith Tomlins^c, Nilupa S. Gunaratna^d

^aInternational Maize and Wheat Improvement Center (CIMMYT), PO Box 2041, Nairobi, Kenya
^bUniversity of Pretoria, Department of Agricultural, Entomology and Plant Pathology
^cNatural Resources Institute, University of Greenwich, Medway, Chatham, Kent, UK
^dHarvard School of Public Health, 677 Harvard Avenue, Boston, MA, USA

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE
IFPRI

IFPRI Discussion Paper 01732
June 2018

The Role of Food Systems and Value Chains to Improve Diets in Low Income Settings
Diagnostics to Support Intervention Design in Malawi

Aulo Gelli
Jason Donovan
Amy Margolies
Noora Aberman

Value chains

Engaging with private sector to advance development goals

We examine:

- Business models
- Access to services
- Business environment
- Emerging opportunities

Looking ahead: continued engagement with PIM, strategy dev. in CIMMYT, fundraising

International Food and Agribusiness Management Review
Volume 18 Special Issue A, 2015

India's Poultry Revolution: Implications for its Sustenance and the Global Poultry Trade

Jon Hellin^a, Vijesh V. Krishna^b, Olaf Erenstein^c and Christian Boeber^d

^aResearcher, ^cDirector of Socio-Economics Program, International Maize and Wheat Improvement Center (CIMMYT), Apartado Postal 6-641, 066000, Mexico City, Mexico

Socioeconomics
Discussion Paper Series

Series Paper Number 42

Value Chains for Sorghum and Millets in Eastern and Southern Africa: Priorities for the CGIAR research program for Dryland Cereals

Alastair Orr, Albert Gierend, and Dyutiman Choudhary
ICRISAT, Nairobi, a.orr@cgiar.org

5/1/2017

INNOVATION for INCLUSIVE VALUE-CHAIN DEVELOPMENT
Successes and Challenges

EDITORS
André Devaux
Maximo Torero
Jason Donovan
Douglas Horton



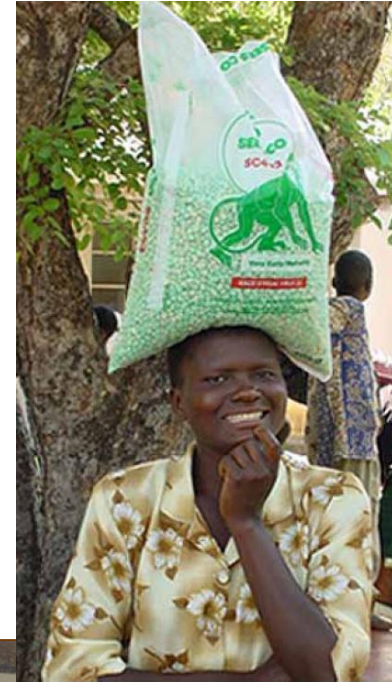
Seed systems

Improving seed access to smallholders

We examine:

- Seed business strategy & capacity
- Business environment
- Sector wide outlook and perspective

Looking ahead: strong project engagement: NSAF, STMA and MasAgro, 5-country seed business assessment, fundraising

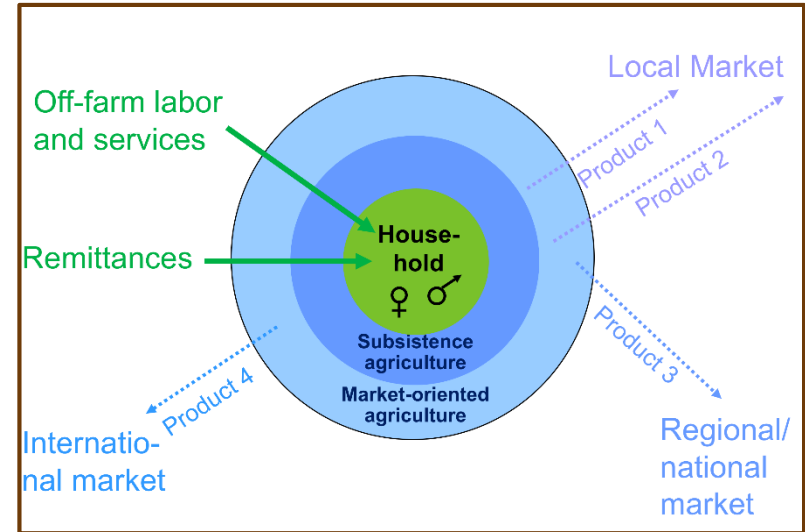


Rural livelihoods

How can maize and wheat interventions strengthen livelihoods?

We examine:

- Asset endowments for value chain engagement
- Access to inputs, services and information
- Role of collectively-owned enterprises
- Options for more effective intervention design



Mountain Research and Development (MRD)
An international, peer-reviewed open access journal
published by the International Mountain Society (IMS)
www.mrd-journal.org

MountainResearch
Systems knowledge

Maize Diversity, Market Access, and Poverty Reduction in the Western Highlands of Guatemala

Jon Hellin^{1*}, Rachael Cox², and Santiago López-Ridaura²

* Corresponding author: j.hellin@cgiar.org

¹ Socioeconomics Program, International Maize and Wheat Improvement Center (CIMMYT), Apdo. Postal 6-641, C.P. 06600, Mexico City, Mexico

² Sustainable Intensification Program, International Maize and Wheat Improvement Center (CIMMYT), Apdo. Postal 6-641, C.P. 06600, Mexico City, Mexico