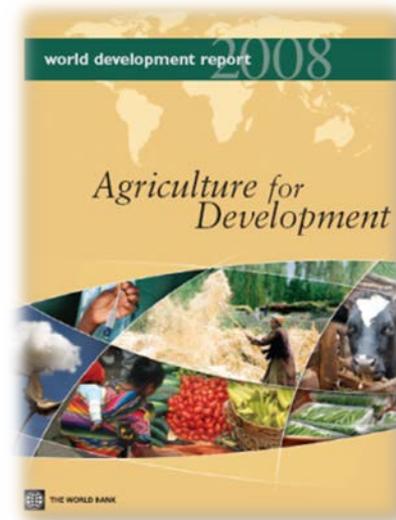
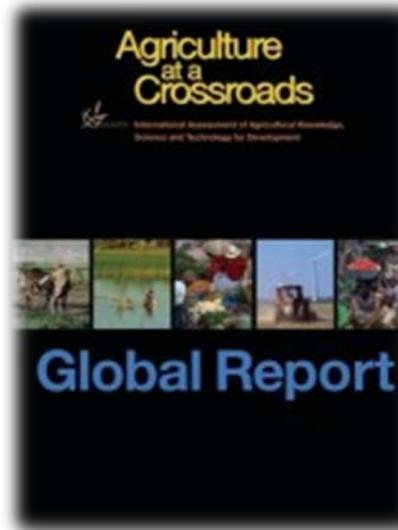
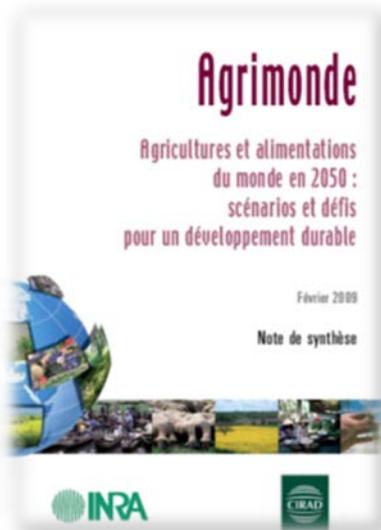
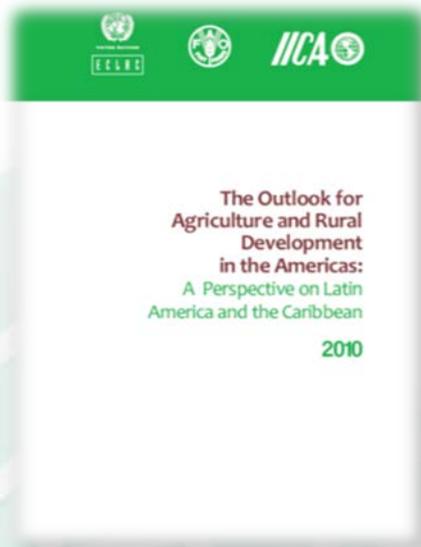
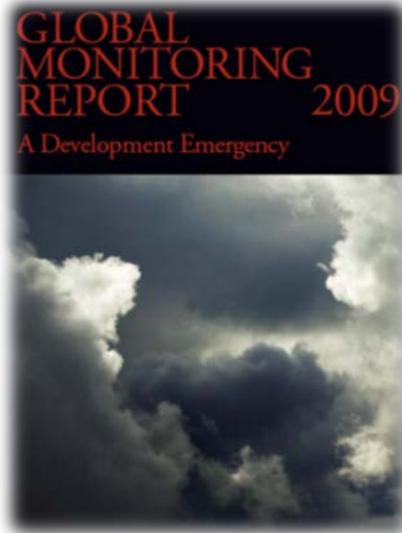
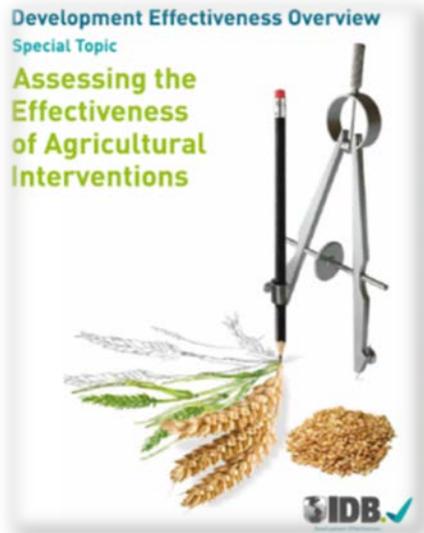




Sustainable research partnerships for global food security



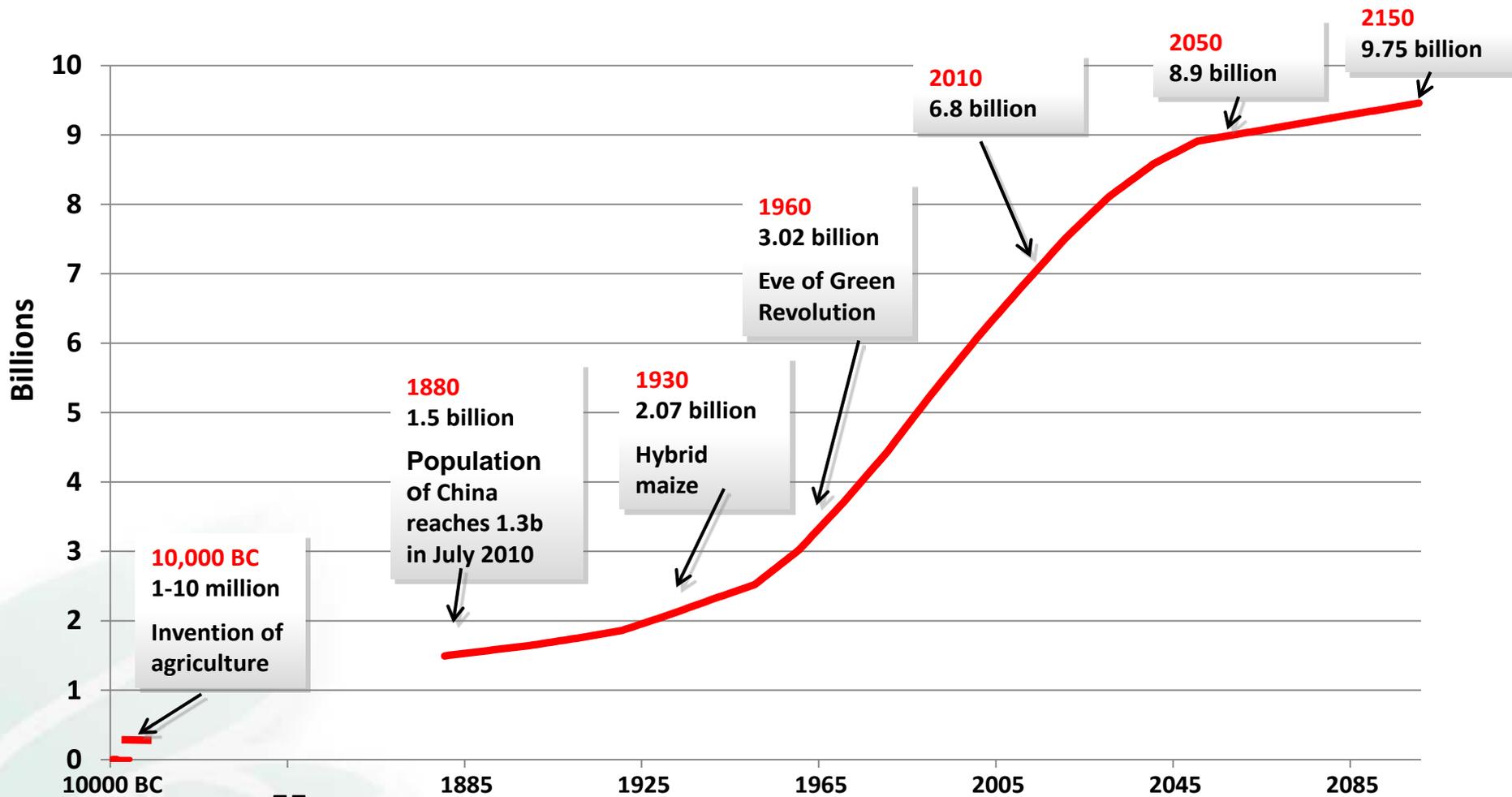
Agriculture is back on the global agenda!



The greatest food security challenge ever in human history:

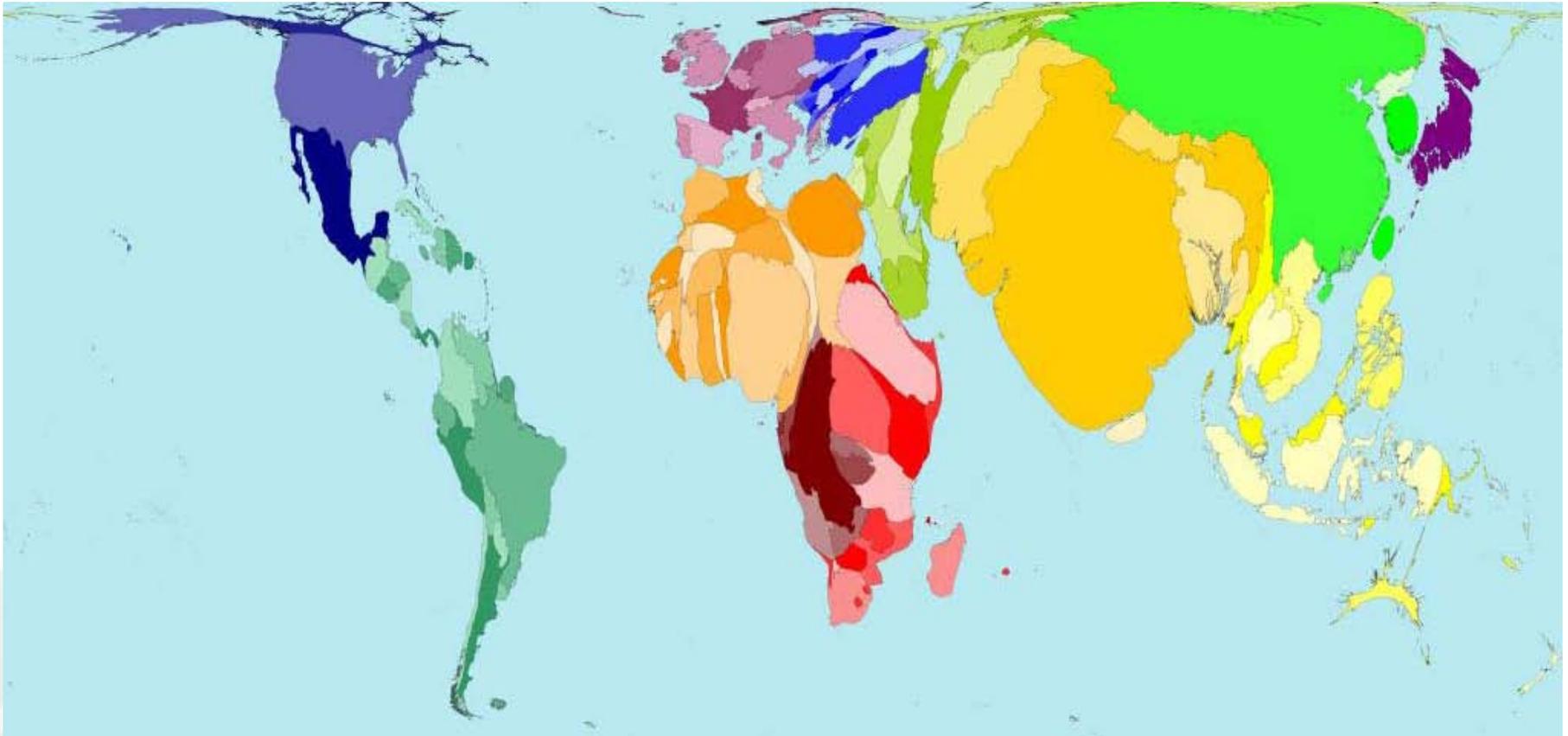
How to feed a growing population with scarce land and water, a fast-changing climate, weak institutional arrangements and inadequate investment in agricultural research!

Long-term Growth in World Population



Source: Pardey (2011) and United Nations (n.d. and 2004)

World Population: Population 2050



Food Insecurity and Undernutrition Remain Persistent

2012 GLOBAL HUNGER INDEX BY SEVERITY



- ≥ 30.0 Extremely alarming
- 20.0–29.9 Alarming
- 10.0–19.9 Serious
- 5.0–9.9 Moderate
- ≤ 4.9 Low
- No data
- Industrialized country

Note: For the 2012 GHI, data on the proportion of undernourished are for 2005–10 for which data are available, and data on mortality are for 2005–10 for which data were not available, and data on countries for which data were not available and countries with no populations.



20 countries have alarming or extremely alarming levels of hunger



Hidden Hunger

A group of children, including a woman carrying a baby, looking towards the camera. The woman is in the center, wearing a striped shirt. To her left is a young girl with a white mark on her forehead. To her right is a young boy. In the background, there are other children, including a boy in a green shirt and a girl in a purple patterned shirt. The background is a bright, outdoor setting, possibly near water.

2 billion+ affected

Photo: C. Hotz

Food availability paradoxes



1.5 billion people suffer obesity worldwide while 1 billion are undernourished

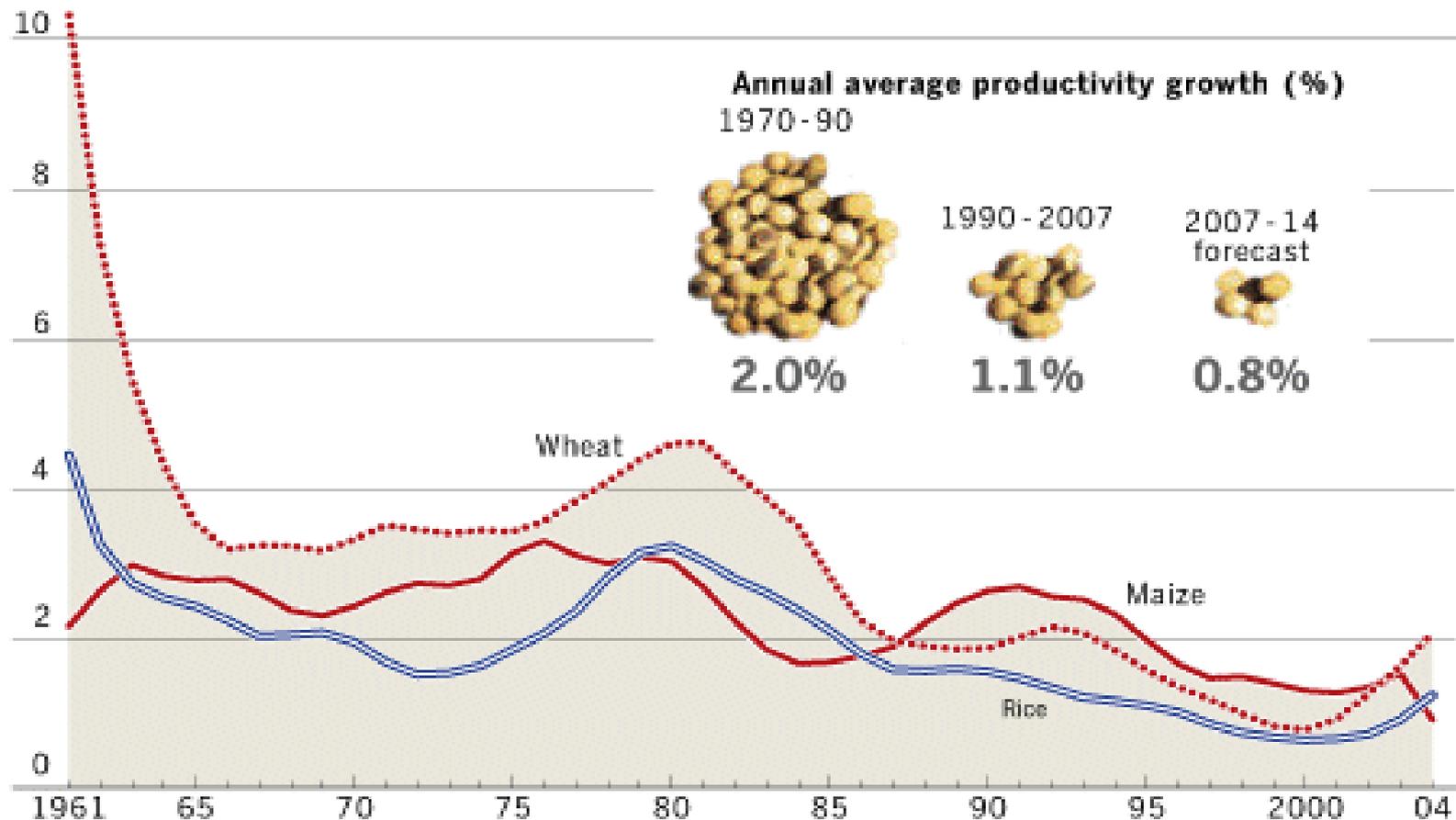


30% of all food crops worldwide are food waste

Agricultural productivity growth is slowing in terms of yield growth

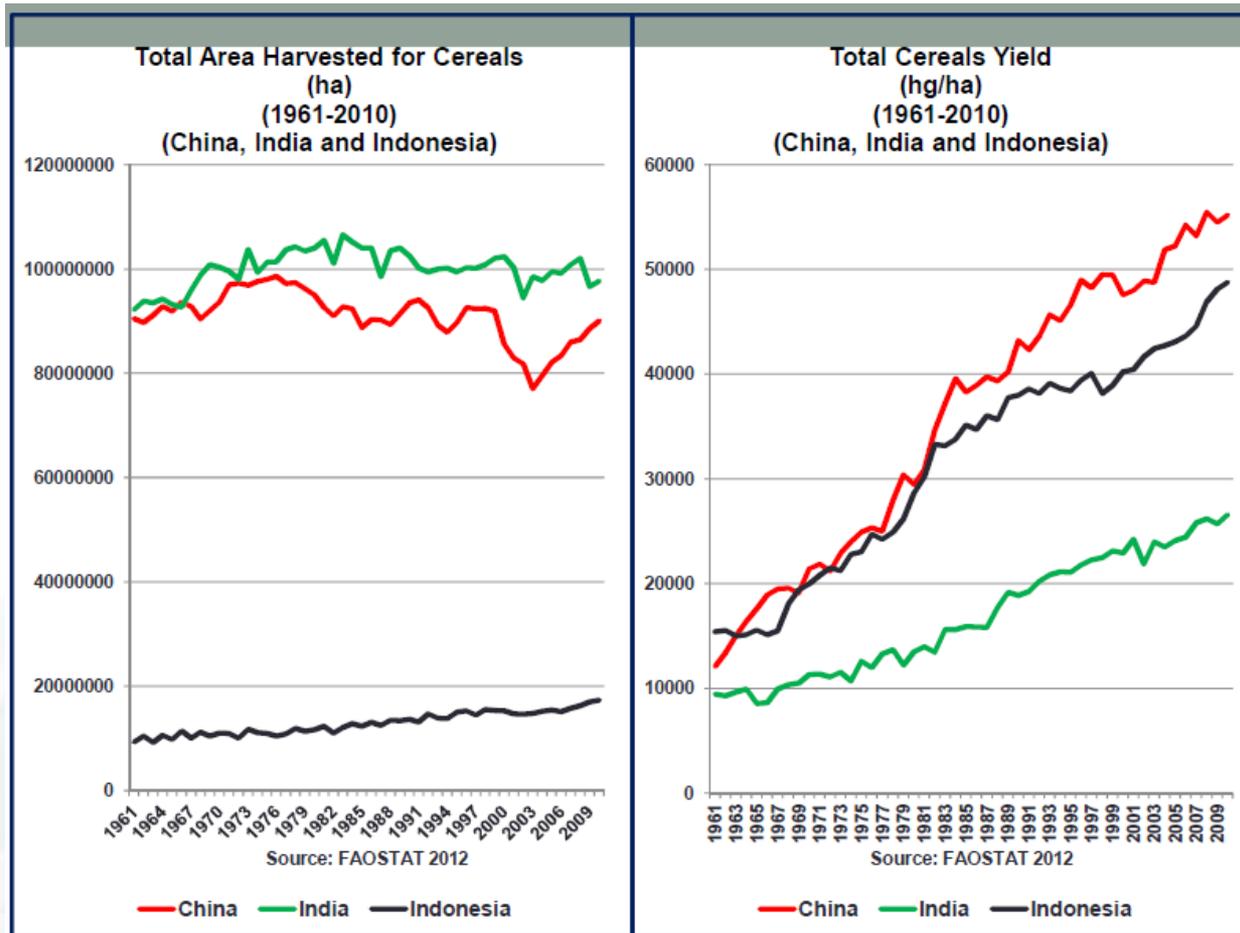
The pace of improvement has slowed steadily...

Annual % change in crop yield

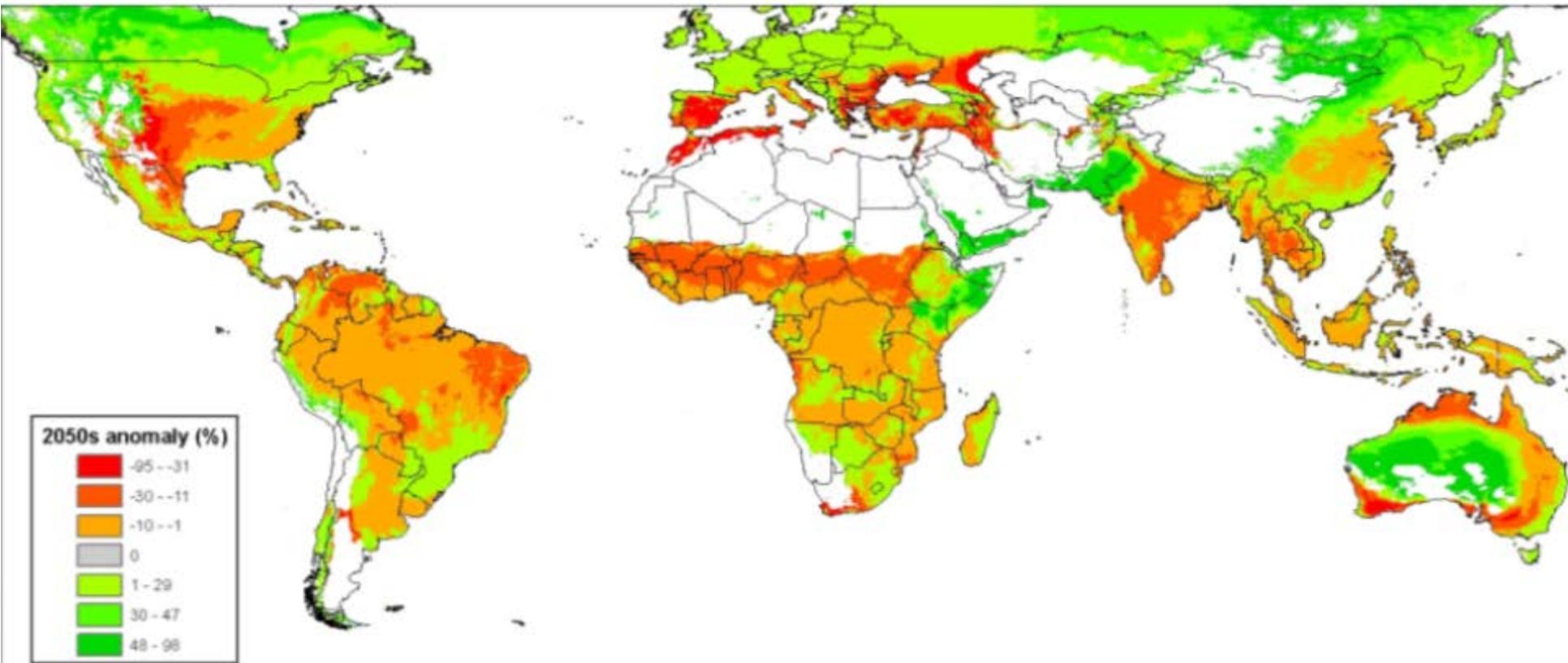


Source: World Bank Development Report 2008 (developing countries only)

Yield Gaps Remain Enormous: e.g., China and India

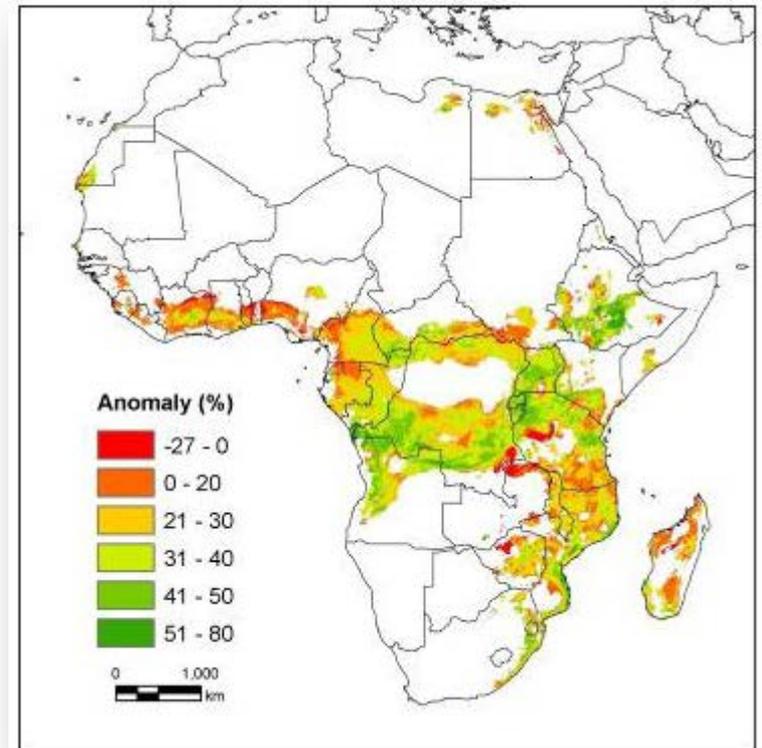
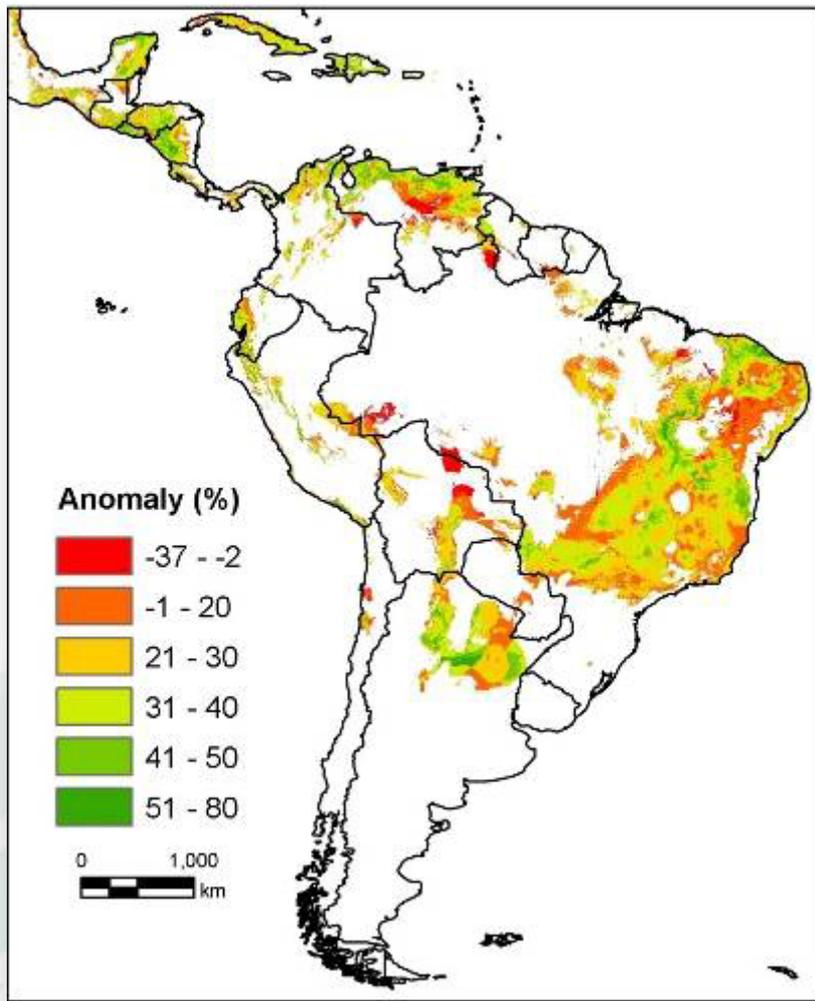


Our ability to grow food is at risk



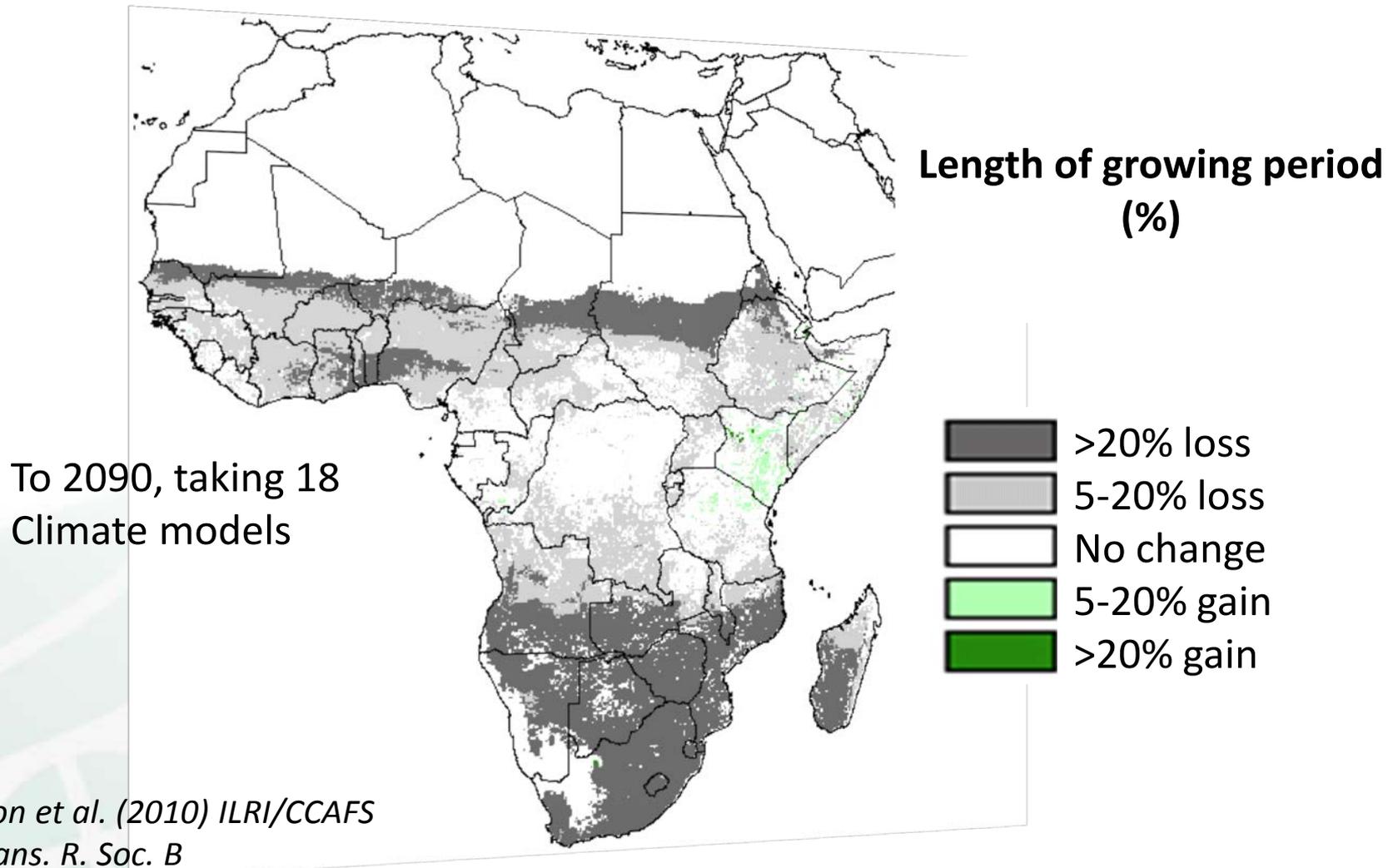
Average projected % change in suitability for 50 crops, to 2050

Pest and Disease Impacts



**Impacts of whitefly
in cassava by 2020**

Length of Growing Season will Decline Drastically

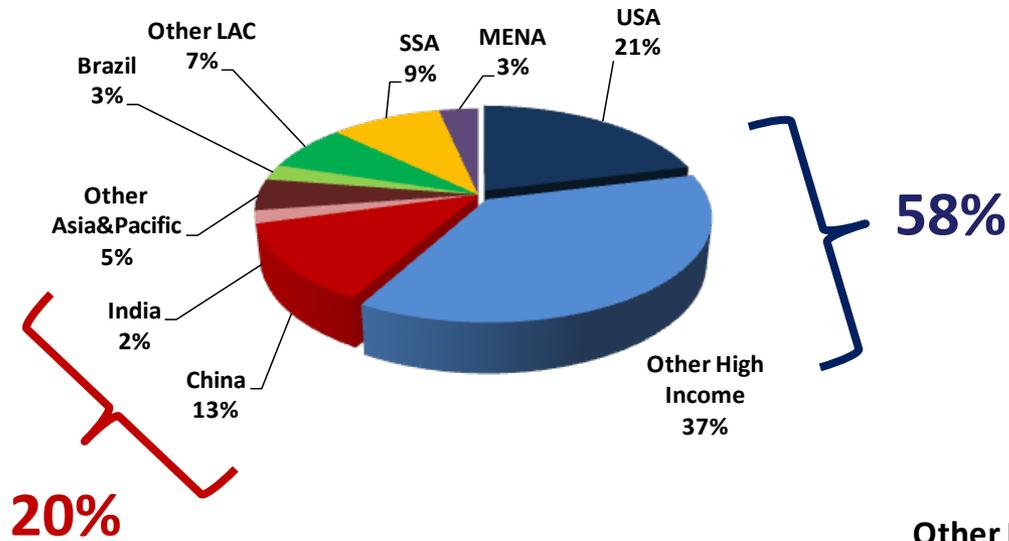


Coffee, Colombia

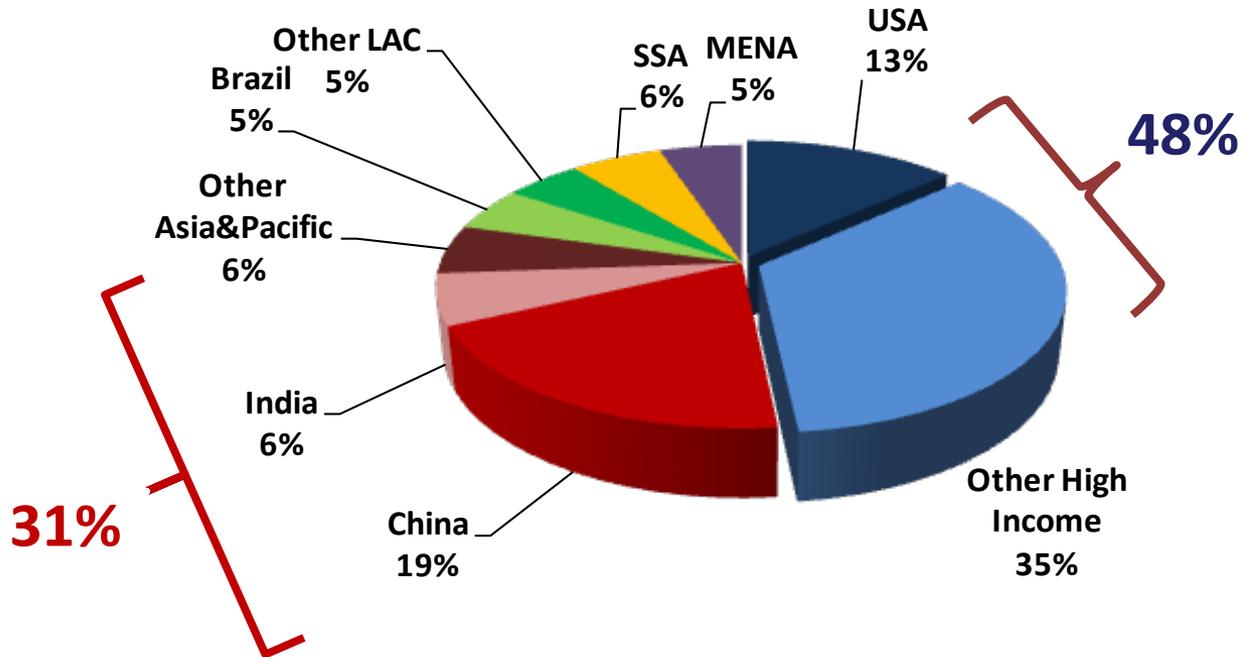
A close-up photograph of coffee cherries on a branch. The cherries are in various stages of ripeness, ranging from bright green to deep red. The background is a soft-focus green, suggesting a coffee plantation setting.

A 2 °C increase equals a difference of 440 meters altitude and major shifts of crops to new areas

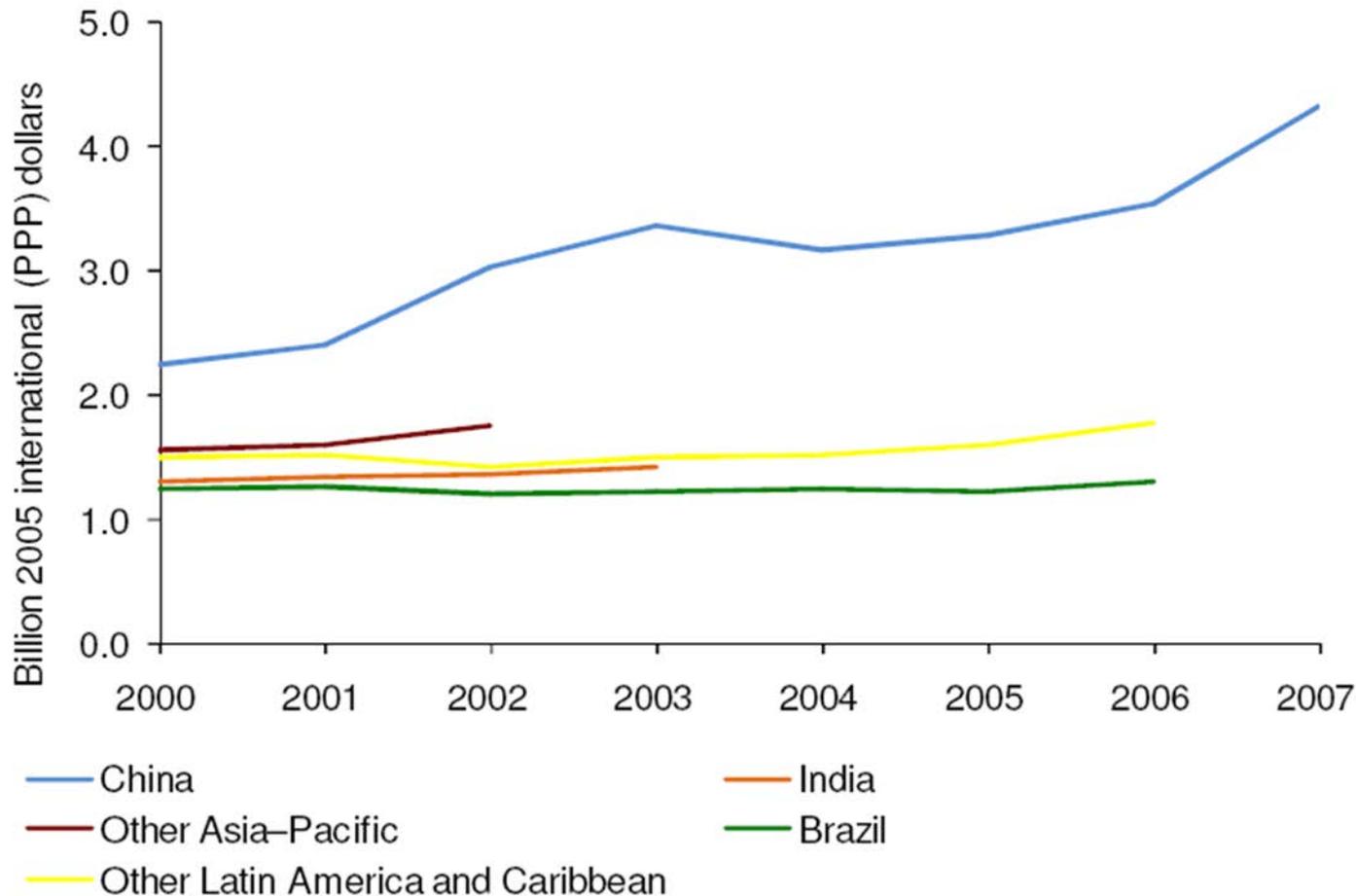
Global Public Agricultural R&D, 1960 and 2009



2009
33.5 billion (2005 PPP\$)

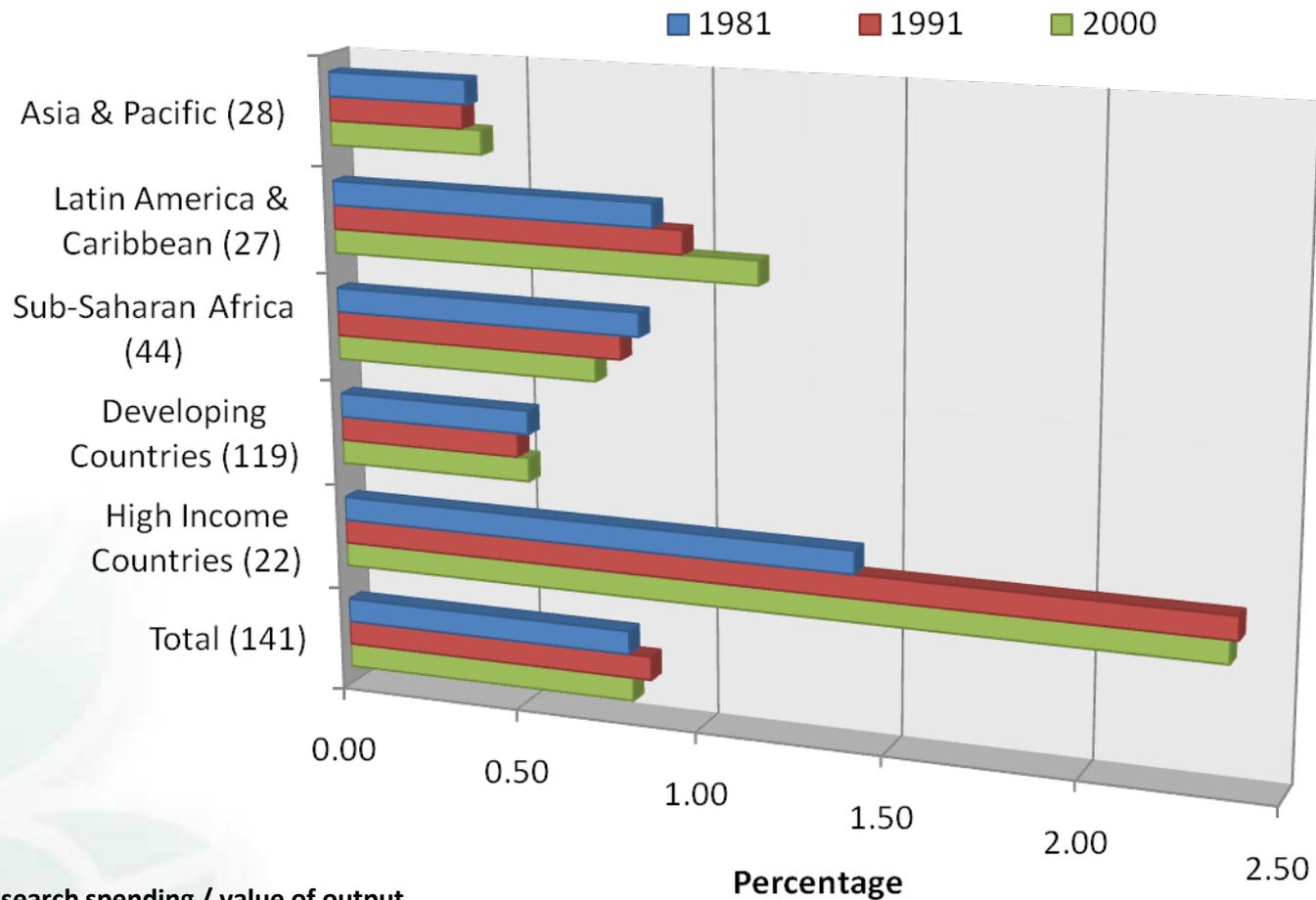


Global agricultural R&D investment trends since 2000



SOURCE: Stads and Beintema (2010)

Public agricultural research intensities



Research intensity = research spending / value of output

SOURCE: Pardey (2006)

Agricultural R&D can find the long-term solutions to the many agricultural and food related crises that we face today.

But unless we find new and better ways to share data and genetic resources, improve our technology transfer and accelerate the sustainable intensification of the world's productive lands, the same crises will continue to grow as world population expands.

Dr. Catherine Woteki, USDA's Chief Scientist and Under Secretary for Research, Education and Economics, September 10, 2013

Savage Chickens

by Doug Savage



CHAOS THEORY SUGGESTS
THAT COMPLEX PATTERNS
OF ORDER EXIST WITHIN
APPARENT DISORDER!



YOU STILL NEED TO
CLEAN YOUR ROOM

© 2011 BY DOUG SAVAGE

CGIAR Consortium



What is the science potential ?

- **Life Science Revolution – molecular biology**
 - Molecular markers for marker aided selection
 - Characterizing genetic diversity
 - Creating new gene pools
- **IT revolution – crop management, precision agriculture**
 - Satellite information to predict crop growth
 - Cheap sensors from soil moisture to weather
 - Mobile phones for extension and market info
- **Holistic approach – ecological intensification**
 - Landscape approach
 - Farming systems and livelihood strategies
 - Innovation Platforms and Value Chain focus

CGIAR Research Agenda



Forests and climate change



RESEARCH
PROGRAM ON
Forests, Trees and
Agroforestry



Forest, Trees and Agroforestry

WHY? Responds to a call for an urgent, strong and sustained effort focused on forest management and governance, given the crucial role of forests in confronting some of the most important challenges of our time: climate change, poverty, and food security

EXPECTED IMPACT in 10 years:

- 0.5–1.7 million hectares of forest saved annually from deforestation
- 0.16–0.68 billion tonnes of carbon dioxide emissions reduced per year = 29–123 million cars off the road annually
- 3 million producers and traders and their families benefit from ecologically and socially sustainable production and management practices
- Double income from forest and agroforestry products for target households

Reducing yield gaps and increasing resilience in rainfed landscapes



RESEARCH
PROGRAM ON
Water, Land and
Ecosystems



Water, Land and Ecosystems

THE CHALLENGE: How to lift millions of farming families out of poverty and improve how land and water resources are managed while maintaining vibrant ecosystems

EXPECTED OUTCOMES by 2020

- 15 million smallholder farmers in sub-Saharan Africa have sustained food security because yield gaps are reduced while maintaining ecosystem functions in rainfed landscapes
- Enhance food security and household income for about 20 million rural people in the Eastern Gangetic Plains by improving access to irrigation

Improved nutrition – balanced diet



RESEARCH
PROGRAM ON
Grain Legumes



Grain Legumes

WHY? Legumes are the cheapest option to improve the nutrition of poor people who often rely on inexpensive but nutritionally-imbalanced starchy diets

EXPECTED IMPACT in 10 years

- 300 million people in smallholder farm households benefit from an average 20% increase in yields
- USD 4.5 billion saved over the decade as cumulative benefits of increased food production and saved nitrogen fertilizer
- Food supplies increased by 7.1 million tons and an additional 415,000 tons of atmospheric nitrogen fixed

A4NH Micronutrient Crops



RESEARCH
PROGRAM ON
Agriculture for
Nutrition
and Health



2011

Cassava
Provitamin A
DR Congo, Nigeria



2012

Pearl Millet
Iron (Zinc)
India



2012

Beans
Iron (Zinc)
DR Congo, Rwanda



2013

Rice
Zinc
Bangladesh, India



2012

Maize
Provitamin A
Zambia



2013

Wheat
Zinc
India, Pakistan

← 2012-2018 Delivery-at-scale: 40 million people from 8 target countries →



Climate-smart agriculture:

Food security in a warmer and more extreme world



LED BY





1. Climate smart technologies, practices, and portfolios



2. Climate information services and climate-informed safety nets



3. Low emissions development



4. Policies and institutions for climate-resilient food systems

CIAT's Contribution to the CGIAR Research Programs



Grain
Legumes



Livestock
and Fish



Rice



Roots, Tubers
and Bananas



Agriculture
for Nutrition
and Health



Managing and
Sustaining Crop
Collections



Research Areas

- Agrobiodiversity
- Soils
- Decision and Policy Analysis



Humidtropics



Climate Change,
Agriculture and
Food Security



Forests,
Trees and
Agroforestry



Policies,
Institutions
and Markets



Water,
Land and
Ecosystems



Dryland
Systems



CIAT's Mission

To reduce *hunger* and *poverty*, and improve human *nutrition* in the tropics through applied *research* aimed at increasing the eco-efficiency of agriculture

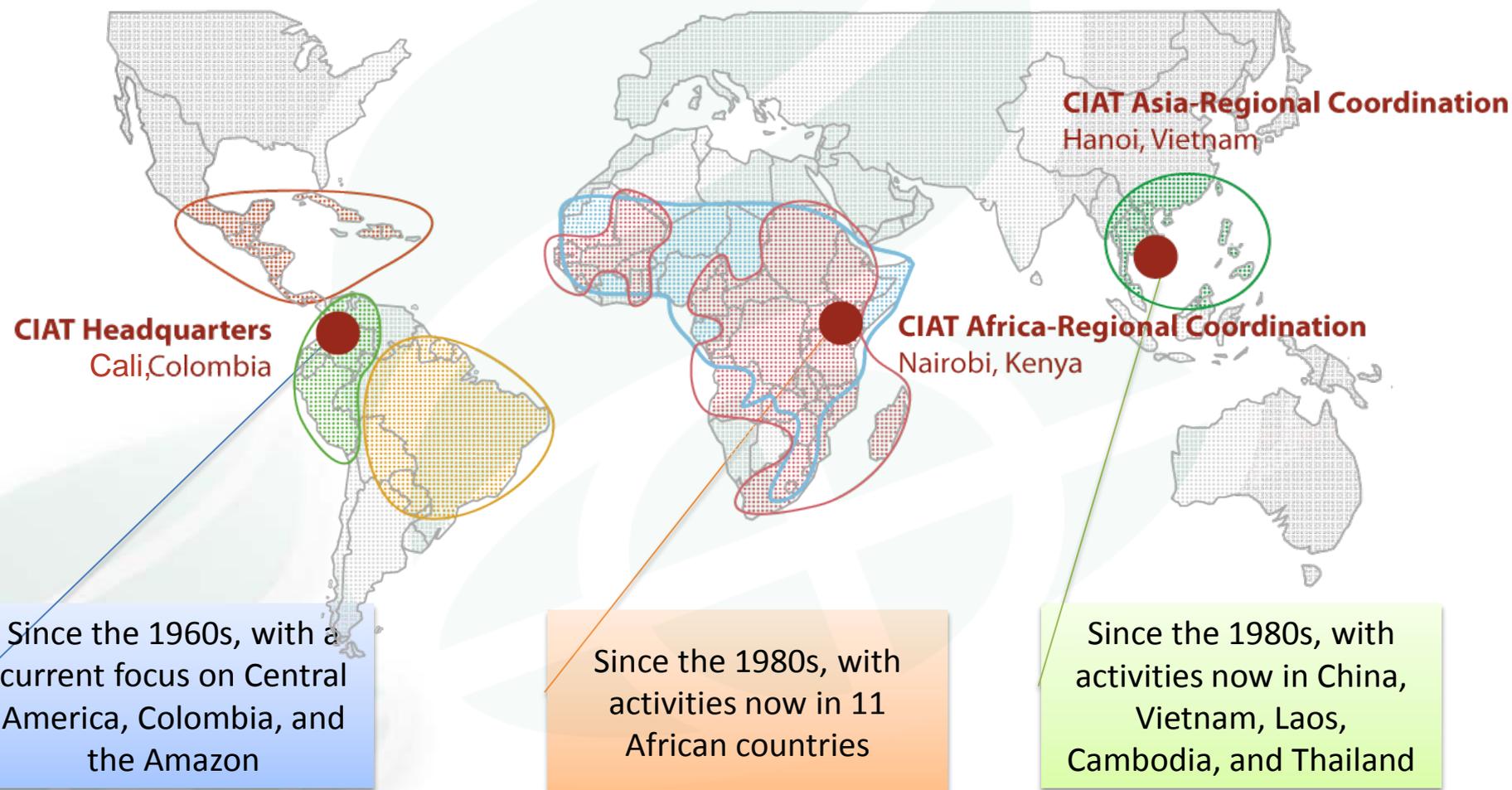
Science for Impact

CIAT: A partner in global research for a food secure future



- Founded in 1967, is one of the 4 Centers that started the CGIAR
- Operates from Kenya, Vietnam, and Colombia (HQ)
- 400 professional staff, 200 scientists working across Africa, Asia, and Latin America. Annual budget US\$100M

CIAT: Improving agriculture and changing lives across the tropics since 1967



Delivering on the Promise of Tropical Agriculture

Creating Quick Wins

CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)

Crafting the Crops of the Future

Efforts intensify to decode cassava "alphabet soup"

"Rambo root" could beat climate change in sub-Saharan Africa

Hybrid rice for Latin America

Regional action to strengthen biosafety

Better crops, better nutrition

Value Chain Reactions

Four-legged futures – Turning Vietnam's cash cows into productive assets

Agricultural transformation in Ethiopia and beyond

Results in the Ground

Quesungual – Remember the name and not just for Scrabble

Africa in the forefront of soils research

Climate Change Exposés

Tortillas on the roaster

Eye in the sky – Terra-i keeps track of deforestation

Colombia and CIAT – Partnering with a Purpose

Ecosystem signposts in Orinoquia

Biopacific Park – Toward a culture of competitive strength

Partnership platforms

Connecting with Colombia's scientific diaspora



CIAT Annual Report 2012-2013

Focus of CIAT's R4D



Productivity

- Bean
- Tropical Forages
- Cassava
- Rice
- Genetic Resources



Natural Resources

- Soil Health
- Soil & Ecosystem Assessment
- Soil & Land Information
- Agronomy & Agriculture



Policy

- Climate Change
- Ecosystem Services
- Linking Farmers to Markets



CIAT is a unique agent of change for global food security, making significant contributions to productivity, natural resource management and policies for smallholder farming systems across the tropics

Research in food security:

- Global view of productivity and sustainability issues and proven capacity to deliver large research impacts
- Innovation lab for strategic results oriented research initiatives

Service to agricultural innovation:

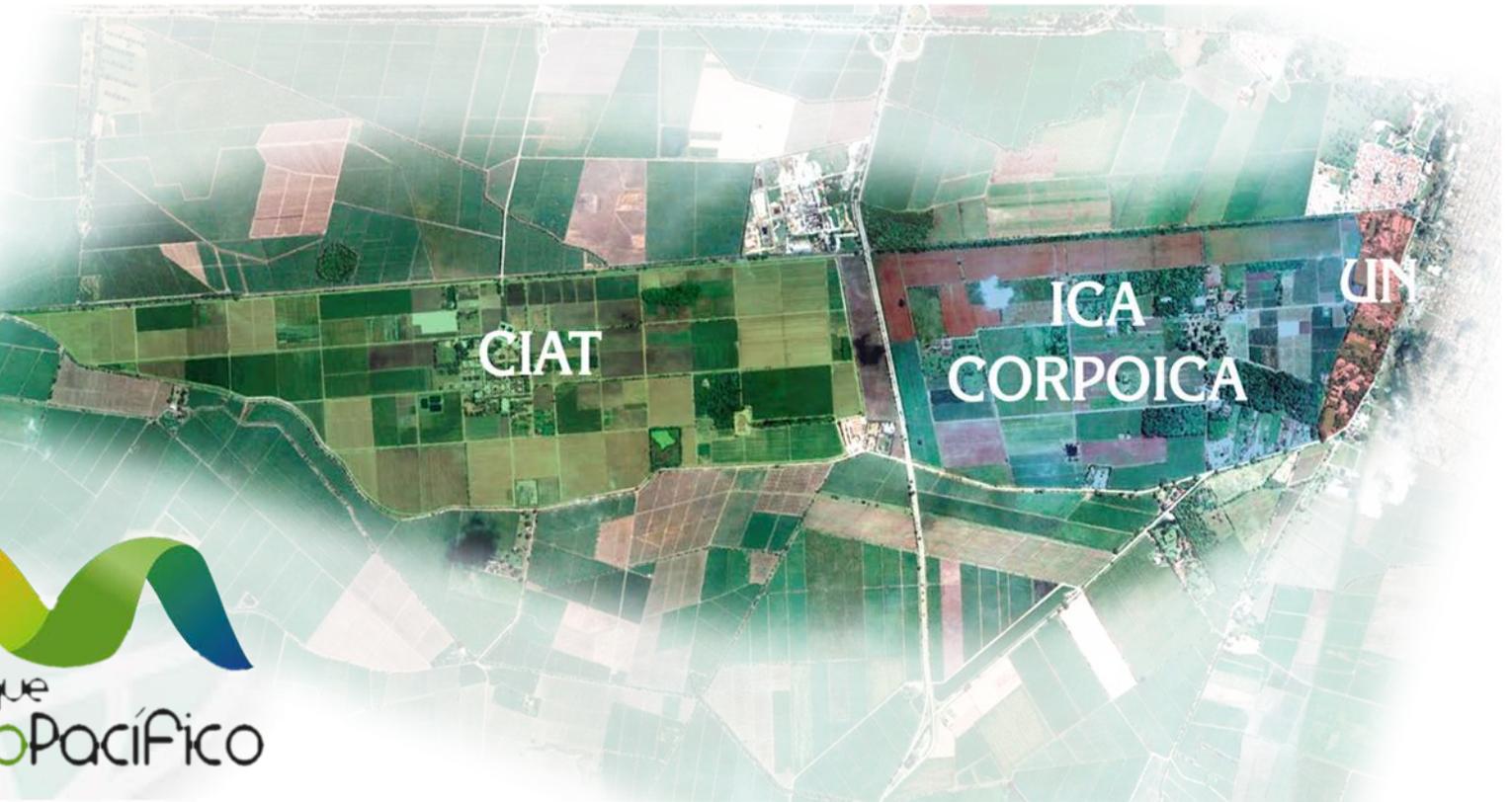
- Convening capacity of extensive multidisciplinary networks in LAC, SSA, and SEA to drive solutions to scale
- Ability to diagnose regional challenges across the globe

**CIAT would like to
significantly scale up
ongoing research
partnerships with top
Agricultural Universities and
the Private Sector**



Expanding CIAT's Role in Incubating Agricultural Technology Biopacific Park (Colombia)

- To promote new bioscience marketing opportunities
- Close to 80 current research lines connected to agribusiness
- Around 1,400 professionals (400 PhD)



Potential themes for collaboration KU & CIAT

- Natural Resource Management
- Ecosystem Services
- Sustainable Food Systems



How to implement KU & CIAT partnerships

- **PhD students** could link their thesis work to our ongoing programs
- **PostDocs** could be part of a research program
- **Professors** (sabbaticals) could be part of CIAT and CGIAR research
- **CIAT senior researchers** could spend research time at KU
- We could jointly mobilize resources to fund such activities!

CIAT: Science to cultivate change



Website: www.ciat.cgiar.org

Blog: www.ciatnews.cgiar.org/en/

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