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CGIAR is a global research partnership for a food secure future

The Scramble for Natural Resources:

How Can Science Help?

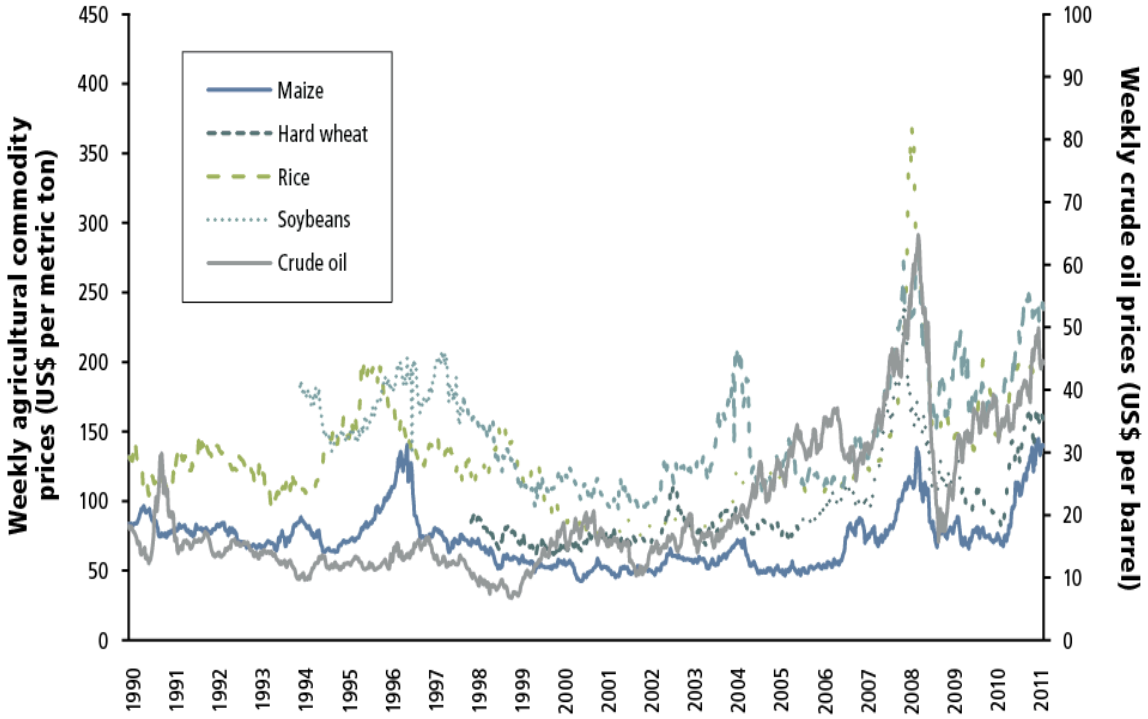
Frank Rijsberman, CEO CGIAR Consortium, 9th October 2012

How can Science Help

- The scramble for natural resources
- How science can help – the state of ag R&D today
- Reinvigorating agriculture: kick-starting the S&T based innovation engine
- The contribution of CGIAR

Food Price Spikes

Inflation-adjusted prices of maize, wheat, rice, soybeans, and oil, 1990–2011



Source: IFPRI

Land Grab in Africa: 30 million HA

BIDCO acquires 26,500 hectares for a palm oil plantation in Uganda

Credit: FoEI / ATI - Jason Taylor

Green Revolution: Intensification in Asia

Development of semi-dwarf, high-yield, and disease-resistant varieties, 1960s-70s

Increased fertilizer use

Massive investment in irrigation

Humanity's Greatest Challenge

Producing 70% more food by 2050, without destroying the environment

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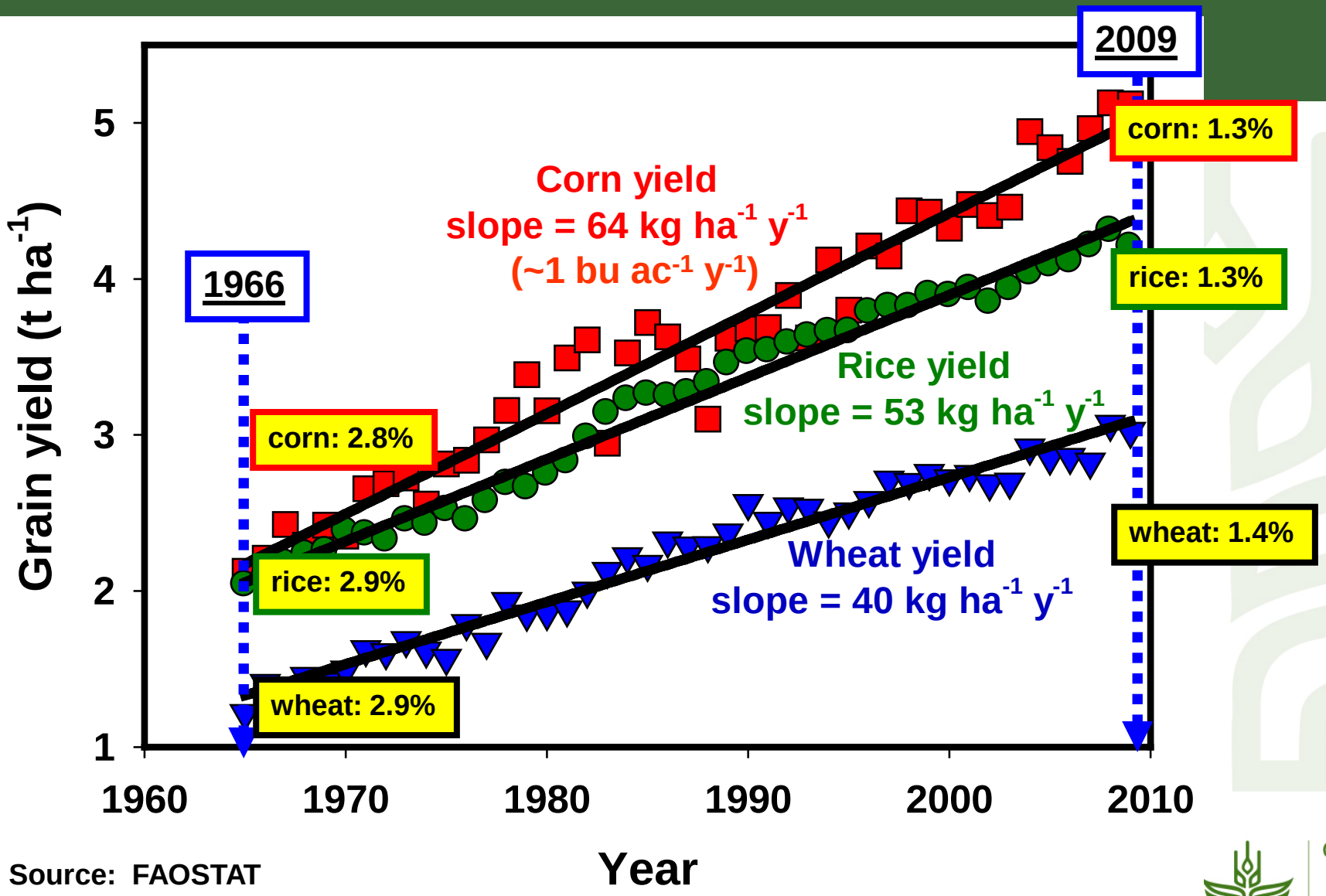
Sustainable Intensification

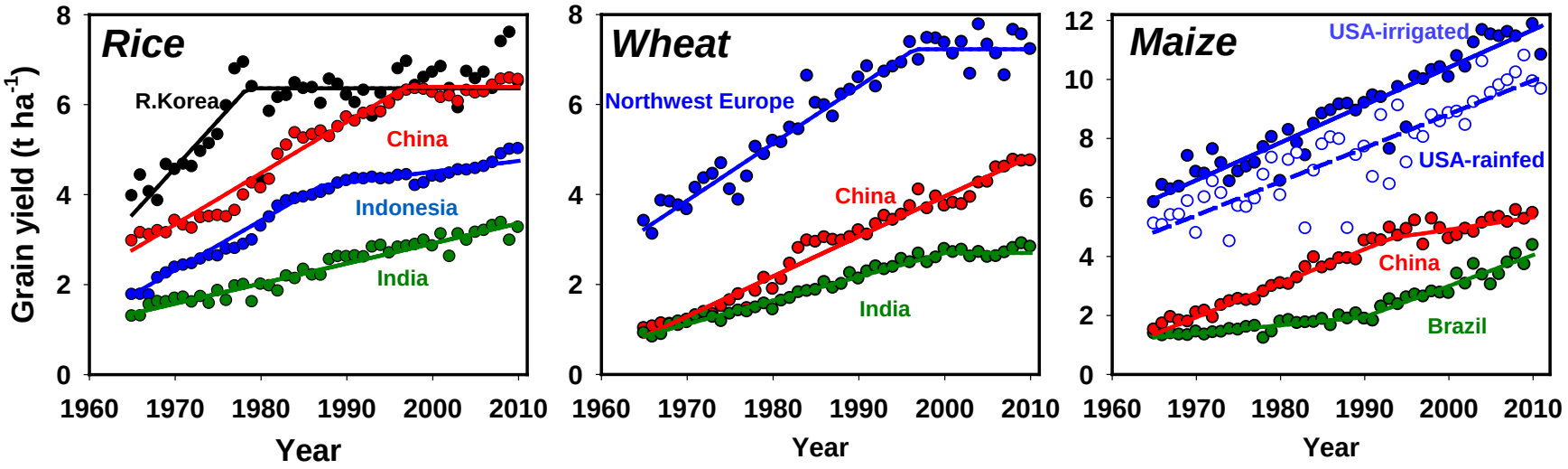
- 75% from land already in use
- By small-scale farmers, majority women
- Where the food is consumed
- In a climate smart way

Global Cereal Yield Trends, 1966-2009



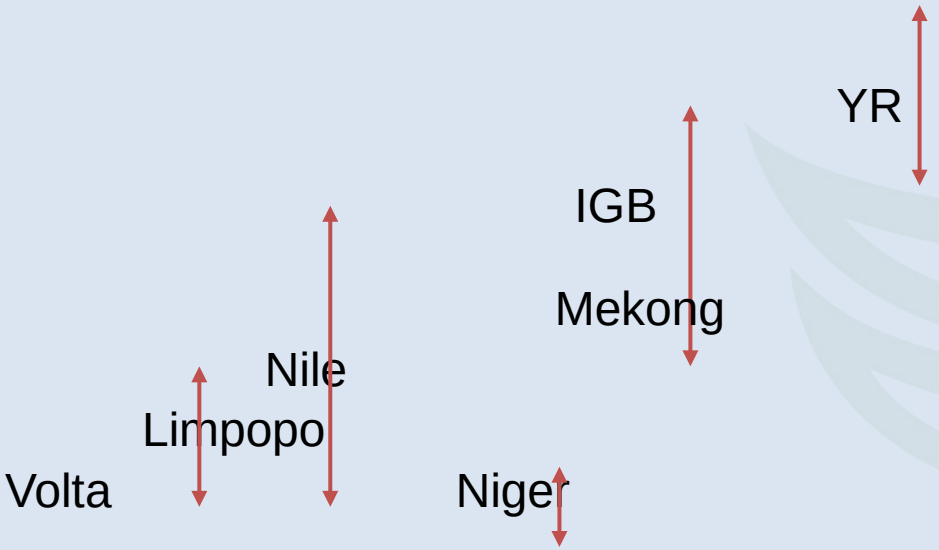
Source: FAOSTAT

Plateau in Yields of Major Grains



Water Productivity remains very low over most areas

WP (estimated potential / typically 1-2 kg/m^3)



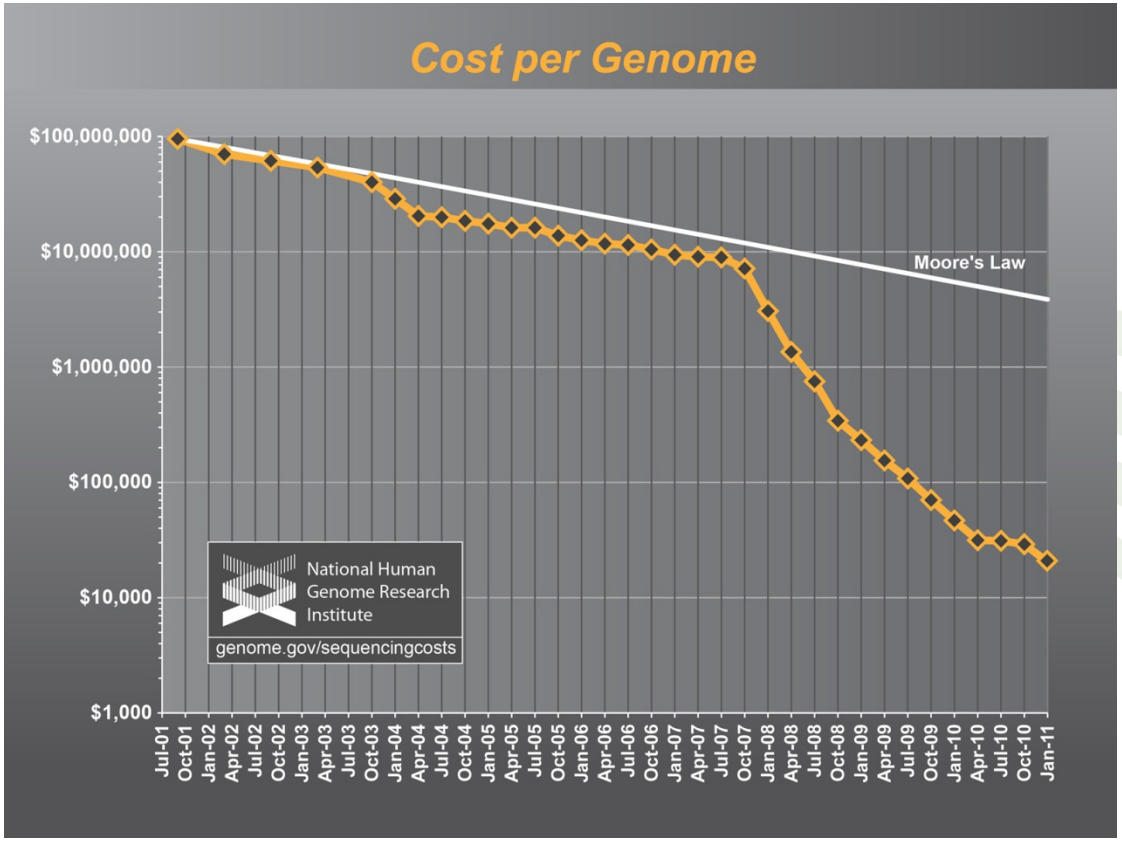
Crop yield gap - Rice

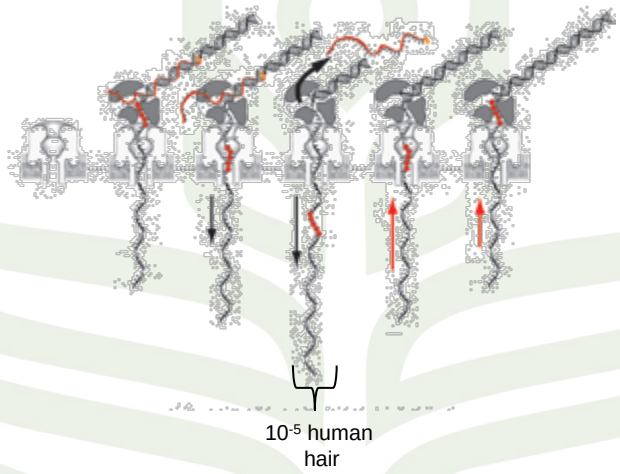
- **IRRI, ideal conditions**
  3 crops of 7 t/ha: **21**t/ha/yr
- **Philippines, irrigated:**
  2 crops of 4 t/ha: **8** t/ha/yr
- **Africa, upland rice:**
  1 crop of **2** t/ha/yr

What is the Potential?

- **Life Science Revolution – molecular biology:**
  - ✓ Molecular markers for marker aided selection
  - ✓ Characterizing genetic diversity
  - ✓ Creating new gene pools
- **IT revolution:**
  - ✓ Laser/GPS based land leveling
  - ✓ satellite information to predict crop growth
  - ✓ cheap sensors from soil moisture to weather
  - ✓ mobile phones for extension and market info

DNA Sequencing Costs Plummeting



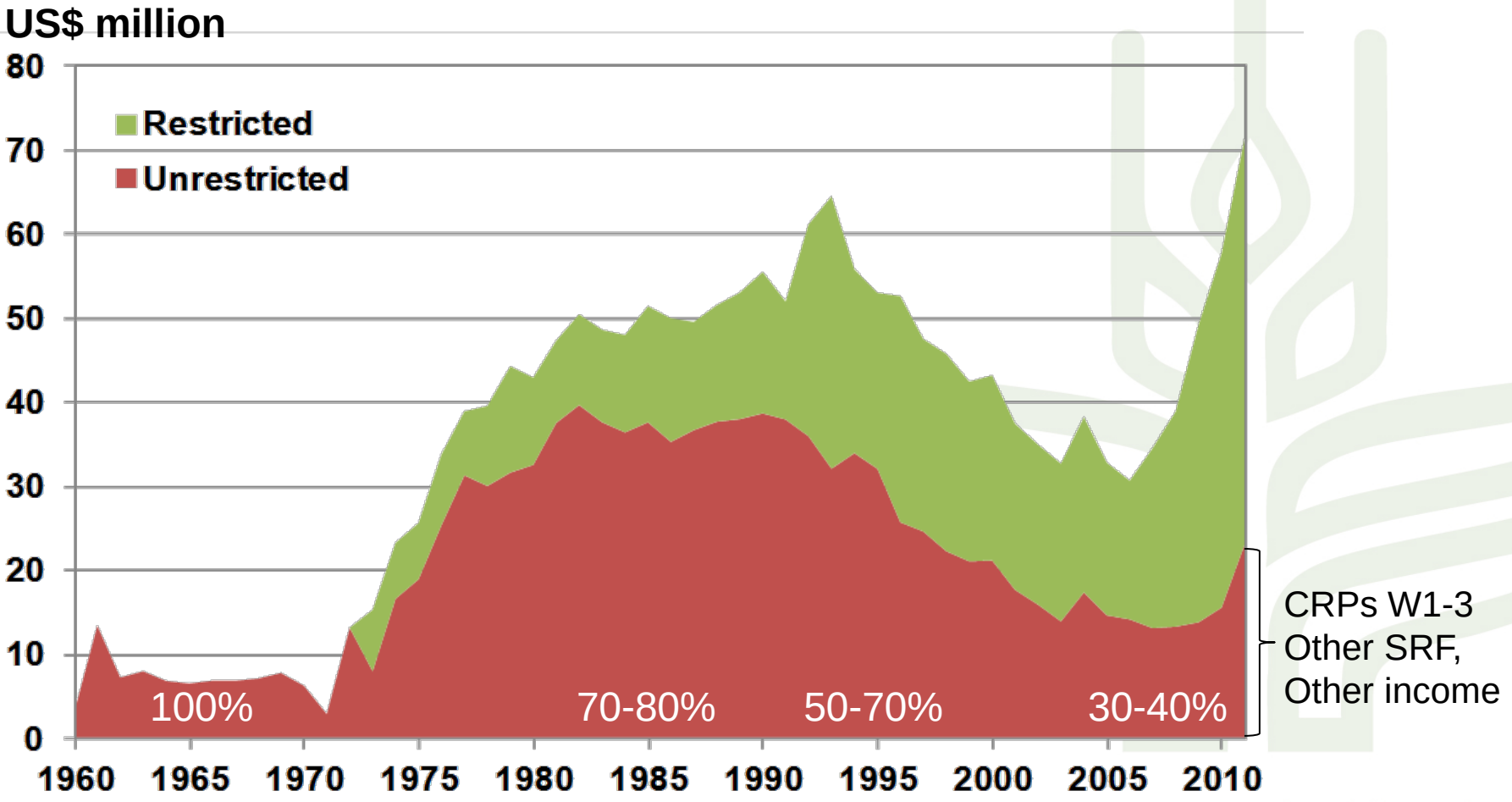


Nanopore Technology Will Lower Costs Even More

CGIAR in 2008 – Pre-reform

- 60 donors loosely coordinating through CGIAR
- 15 independent research centers
- 3000 bilateral projects
- Unrestricted support down from 50-60% to 20-30%
- Overhead costs 24% on average
- Very little strategic research
- Funding stagnant at about $400M/yr

CGIAR Rice Research: IRRI's Funding

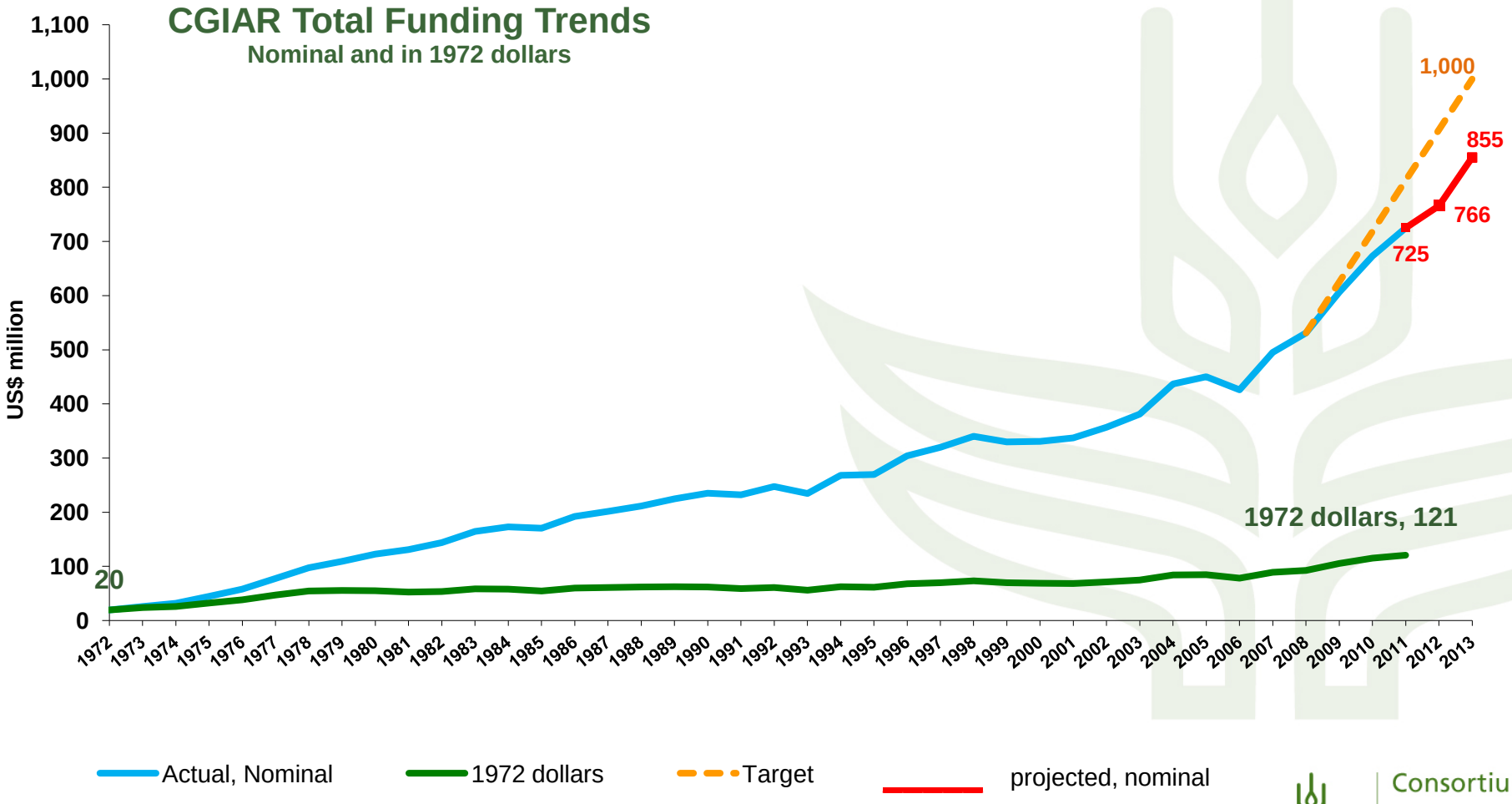


Inflation adjusted IRRI funding (GDP deflator, 2005=100)

New CGIAR in 2012

- Donors united in CGIAR Fund
- Centers united in CGIAR Consortium
- 16 CGIAR Research Programs
- Core support through Fund ~ 35%
- Overhead costs down to 16%
- Some space for strategic research
- Funding up to over $850M in 2012

Upswing in Investment



CGIAR Research Agenda

Overarching themes

Gender
Capacity Strengthening
Partnerships/Stakeholder Engagement

Improve productivity and profit for crops, fish and livestock

Improve sustainability of natural resource base, climate change adaptation and mitigation

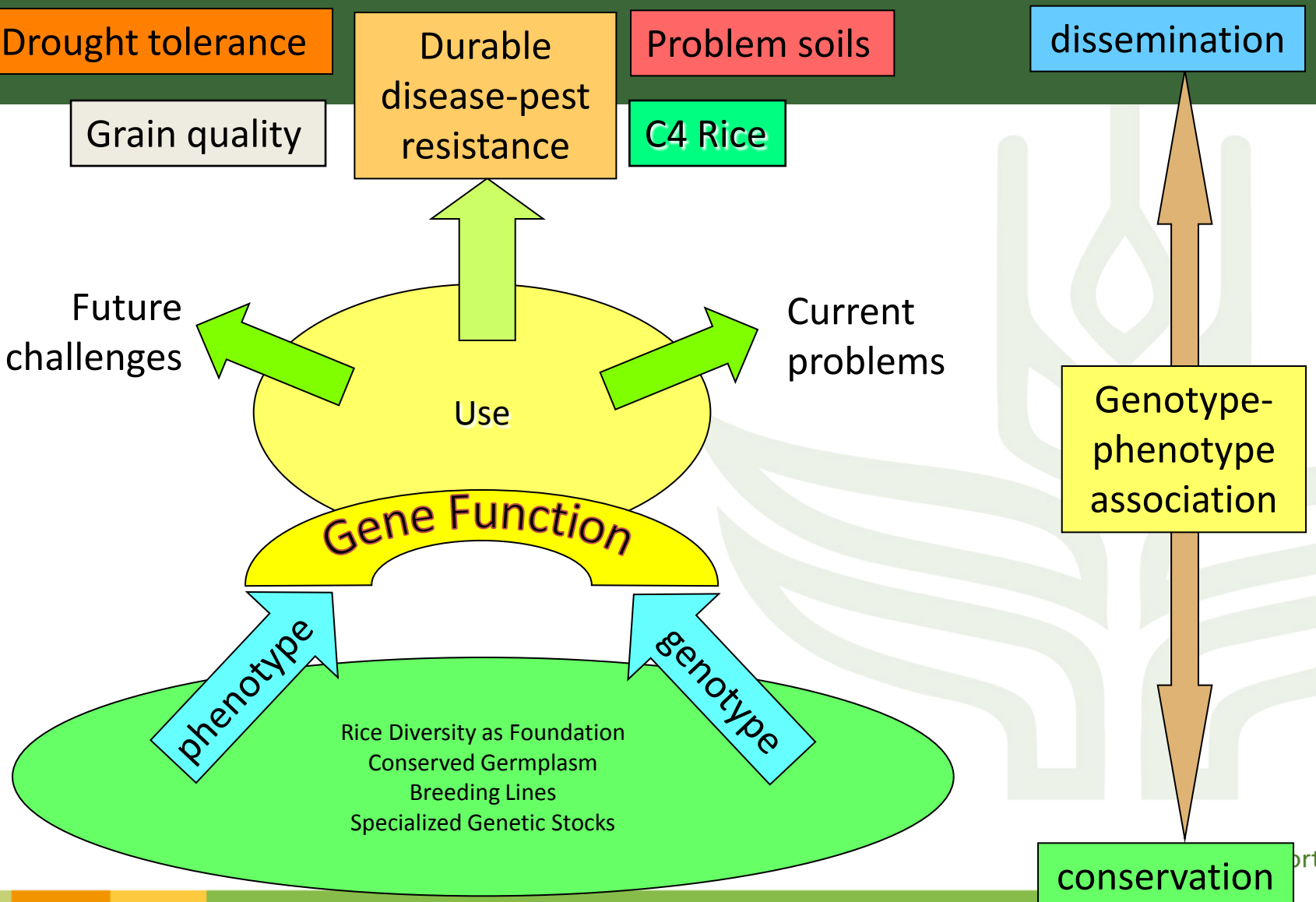
Improve productivity, profitability, sustainability and resilience of farming systems

Improve policies and markets

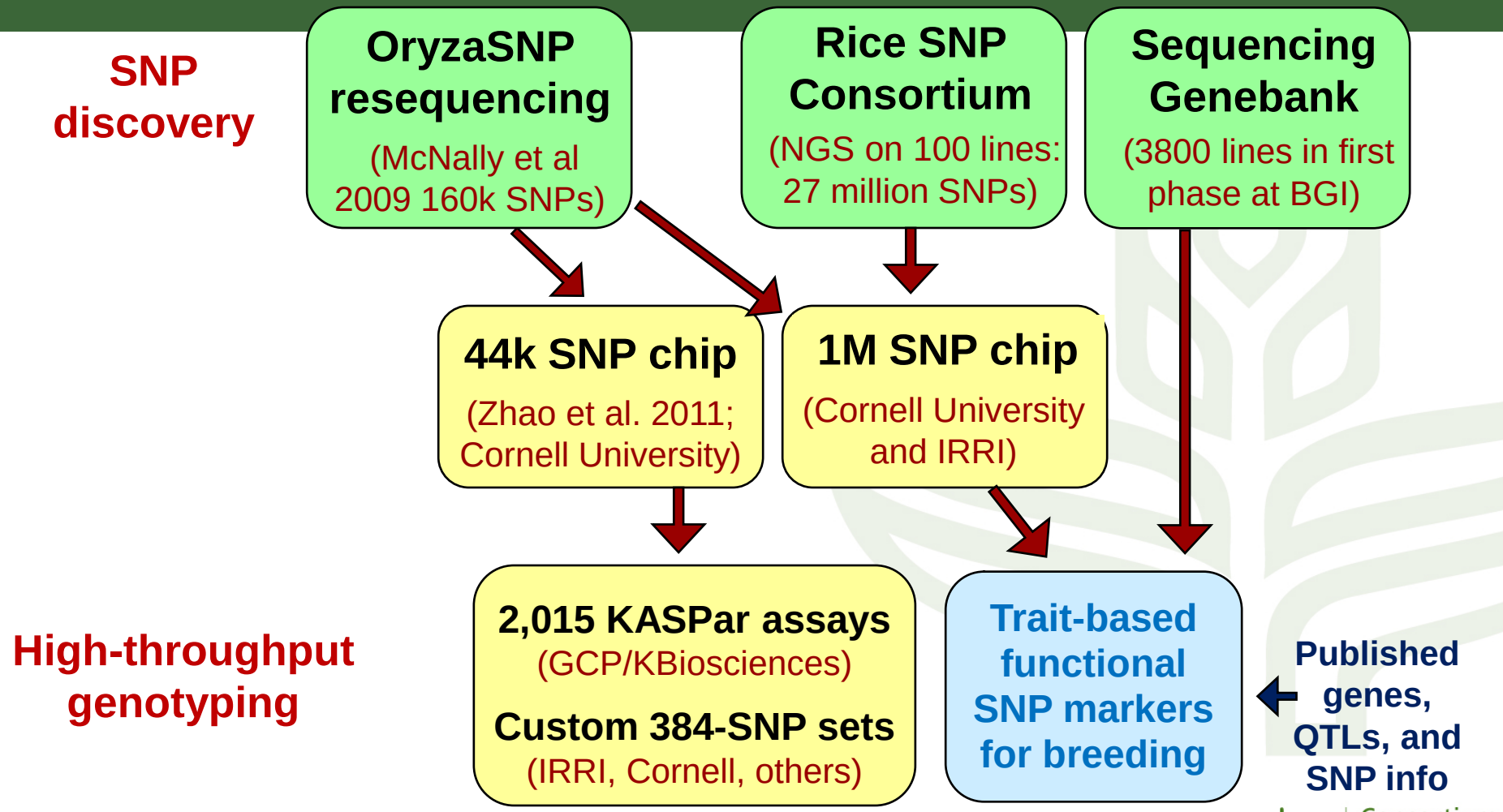
Improve nutrition and health

Reducing Rural Poverty, Improving Food Security, Improving Nutrition and Health, Sustainably Managing Natural Resources

Genetic Diversity Research Platform



New Resources for Gene Discovery



Making Rice Climate-proof

CGIAR Genebanks

The genetic diversity treasure chest

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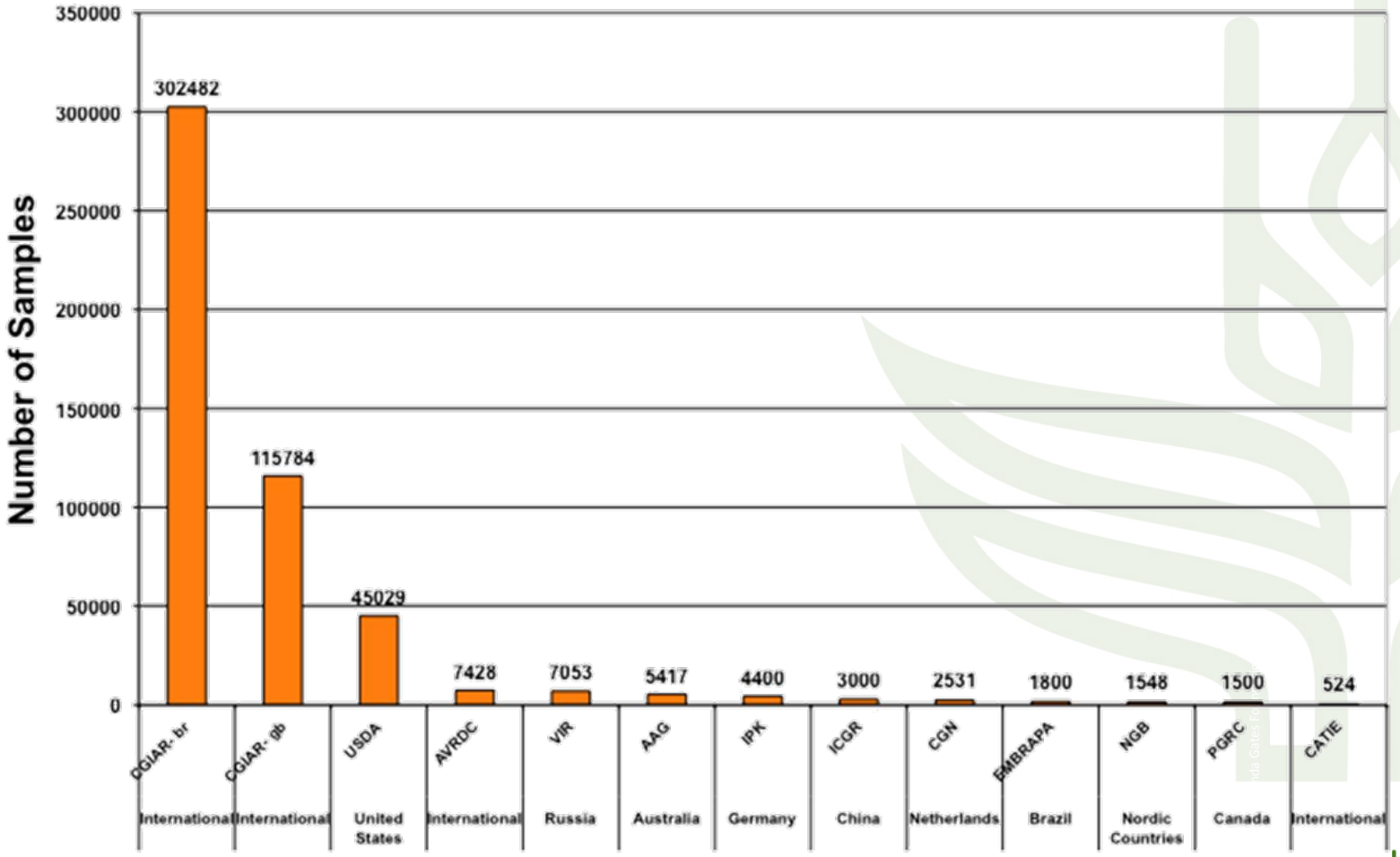
International collections

		Accessions
AfricaRice	Rice	20,000
Bioversity	Banana, Plantain	1,298
CIAT	Beans, Cassava, Tropical forages	65,635
CIMMYT	Maize, Wheat	155,129
CIP	Potato, Sweet potato, Andean Roots & Tubers	16,495
ICARDA	Grain legumes, Wheat, Barley, Forage & range crops	134,160
ICRAF	Trees	5,144
ICRISAT	Dryland cereals, Grain legumes	156,313
IITA	Banana, Plantain, Maize, Cowpea, Cassava, Yam	28,286
ILRI	Tropical forages	18,291
IRRI	Rice	110,817
Total		**711,568**

Genebank Samples Distributed per Year



Source: Collections online databases, publications, and personal communications between Trust and Genebank Managers, 2008,-2010

Holistic Approaches

Microscope to marketplace

- ✓Better varieties, more quickly
- ✓Access to planting material for small-scale farmers
- ✓Biodiversity
- ✓Biofortification

Economic Payoffs from CGIAR

- 2 -10 dollars of economic benefit for each 1 dollar invested
- 7,250 improved varieties developed
- Total 60% all area planted with improved varieties

Benefits to Australia

- 98% wheat from CIMMYT
- $750 million increased value (wheat)
- Broad bean (fava bean) and lentil germplasm from ICARDA
- Chickpea disease resistance and barley drought tolerance, from ICARDA

Drought-Tolerant Maize

Photo credit M. DeFreese/CIMMYT

Extra money from maize to pay school fees, finish house, build chicken coop.

Sharifa Numbi, Tanzania

Sweetening Lives with Vitamin A-Rich Sweetpotato

Doubling vitamin-A consumption among those most at risk of deficiency and its devastating consequences

Easing Pressure in Land-challenged Rwanda

Photo credit: Neil Palmer/CIAT

Climbing beans are three times more productive than bush beans

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Sea Cucumbers: Economic Saviour

ACIAR and the WorldFish Center have invested in commercial cultivation of sea cucumbers in Vietnam, the Philippines, Solomon Islands, New Caledonia, Fiji and Australia since the mid 1990s.

In Vietnam sea cucumbers are grown in shrimp ponds, and in rotation with shrimp.

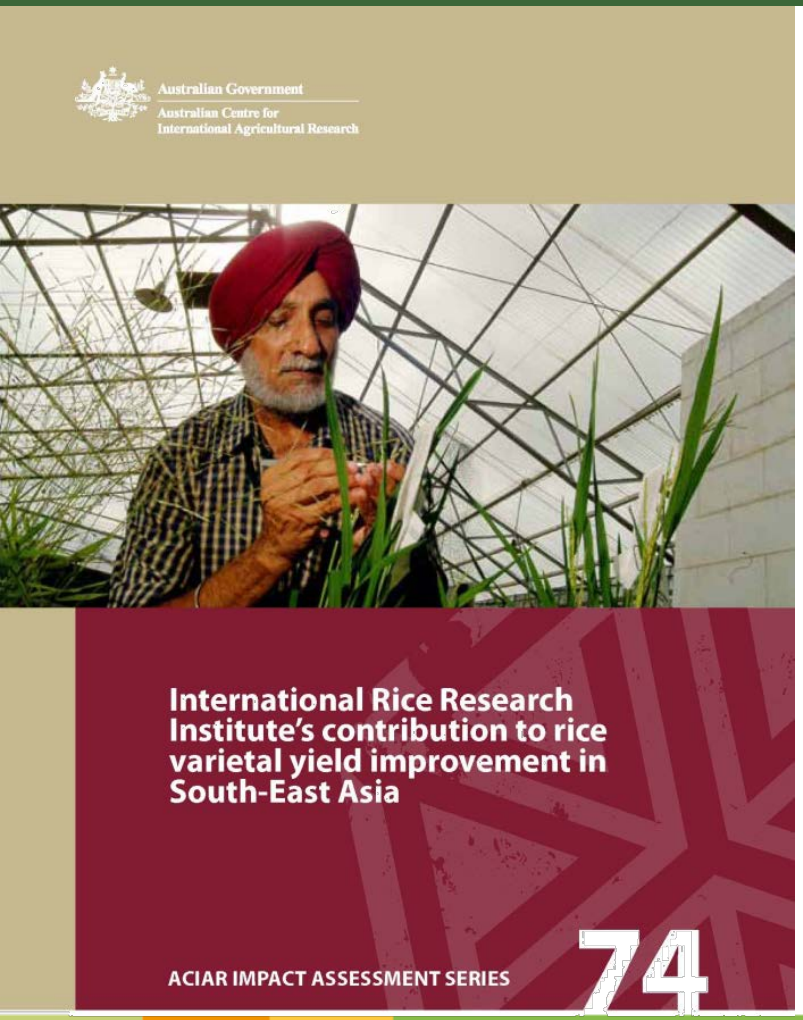
Fertilizer Tree Systems

Planting trees that improve soil quality can help boost crop yields for African farmers.

Photo credit: World Agroforestry Center (ICRAF)

Fertiliser tree systems (FTS) also help boost food security and play a role in "climate proofing" the region's arable land.

ACIAR Impact Assessment of CGIAR



- **ACIAR 2011 impact assessment of IRRI's rice breeding in Vietnam, Indonesia, Philippines**
- **Benefits: $1.46 billion *per year* from 1985 - 2009**

"This means farmers are now harvesting more rice per hectare, which not only lifts them out of poverty, but contributes toward the worldwide challenge of feeding the estimated global population of 9 billion people in 2050,"
Minister for Foreign Affairs Kevin Rudd,
September 2011.

Concluding

- The food price spikes of 2007/8 led to a scramble for natural resources; e.g.land grabs in Africa.
- Science ***can*** help to grow more food with less land and water – through sustainable intensification.
- The new CGIAR has developed a strategic portfolio of research programs for a food secure future for all - without wrecking the planet.
- CGIAR's work also benefits Australia.
- Australia's strong support for CGIAR through ACIAR and AusAid is critical and much appreciated.

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THANK YOU