



Fund

Fund Council

4th Meeting (FC4)—Montpellier, France

April 5-6, 2011

**"Wheat: Global Alliance for Improving Food Security and the
Livelihoods of the Resource-Poor in the Developing World"**

(Presentation by Marianne Banzinger)

*Document presented for Agenda Item 14:
CRP 3.1 - Wheat*

Submitted by:
CIMMYT

WHEAT-Global Alliance for Improving Food Security and the Livelihoods of the Resource-poor in the Developing World

Proposal submitted by CIMMYT and ICARDA
to the CGIAR Consortium Board



In collaboration with
Bioversity, ICRISAT, IFPRI, ILRI, IRRI and IWM

86 National Agricultural Research Institutes • 13 Regional and International Organizations • 71 Universities and Advanced Research Institutes • 15 Private Sector Organizations • 14 Non-Governmental Organizations and Farmers Cooperatives • 20 Host Countries

4 March 2011

WHEAT

Bioversity, **CIMMYT**, **ICARDA**
ICRISAT, IFPRI, ILRI, IRRI
and IWM

86 National Agricultural
Research Institutes

13 Regional and International
Organizations

71 Universities and Advanced
Research Institutes

15 Private Sector
Organizations

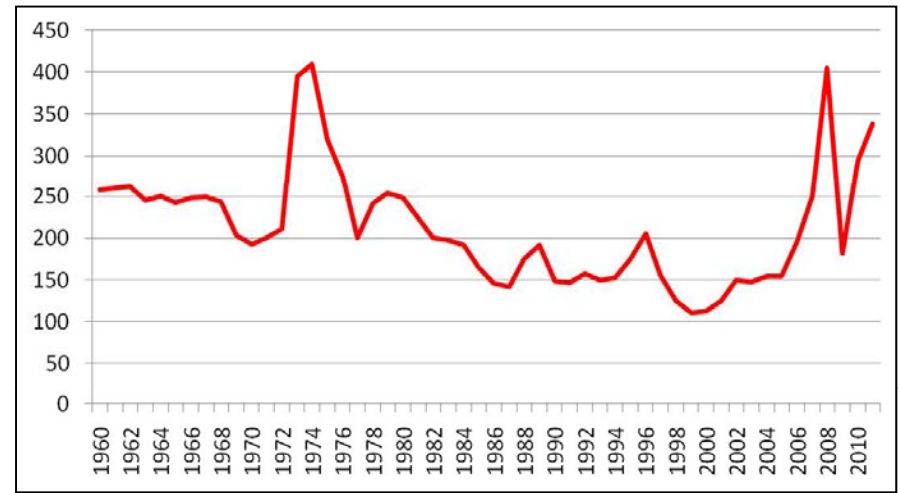
14 Non-Governmental
Organizations and Farmers
Cooperatives

20 Host Countries

Red alert zone for global food security

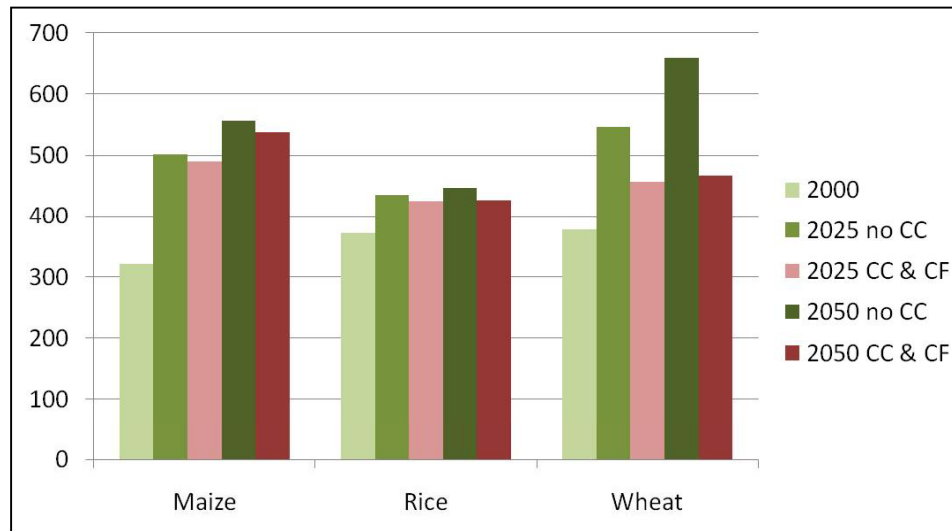
- Demand for wheat is increasing by >40%.
- Production lags behind demand
- Further decreasing global stocks
- International markets fail the poor
- Financial realities in first world “bread baskets” and on global financial markets do no longer tally with what the poor in developing countries can pay for food
- Urgent demand to increase **local production** in low and middle income countries
- Genetics + Agronomy + Markets + Risk management + Policies + Infrastructure

Real wheat prices (USD) 1960 - 2011

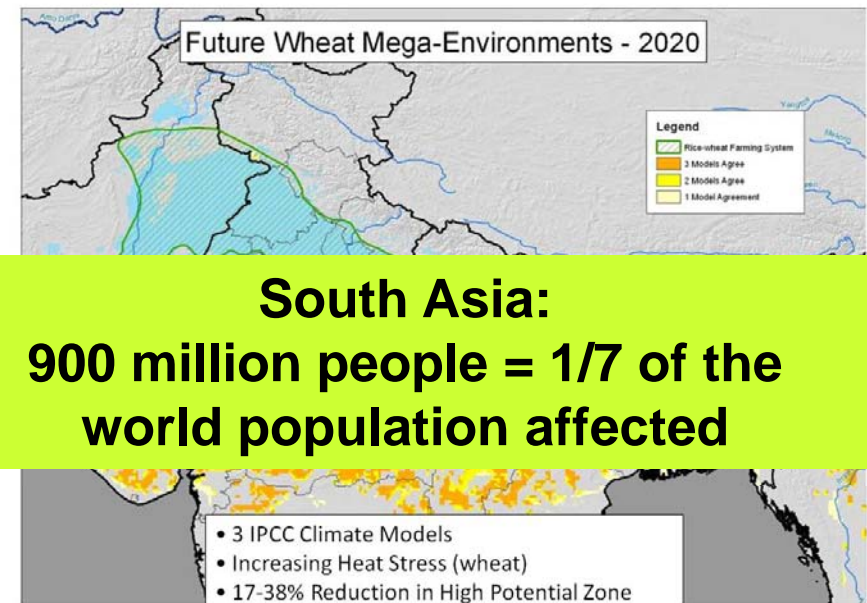


Specific challenges to wheat

- Wheat in developing countries most strongly affected by climate change
 - 2025: USD 15-20 billion losses pa (12–16%)
 - 2050: USD 32-48 billion losses pa (20–30%)
 - 10% Yield potential loss for every C⁰ increase



Impact of climate change on production (IFPRI, 2010)



Specific challenges to wheat

- Threatened by globally important diseases
- 50% of GWP budget invested in maintenance breeding
- Recent CG-plus interventions are increasing diversity and building up more durable resistance



Stem rusts: 90 percent of the world's wheat varieties have no resistance; 19% of the world wheat production in Risk Zone 1

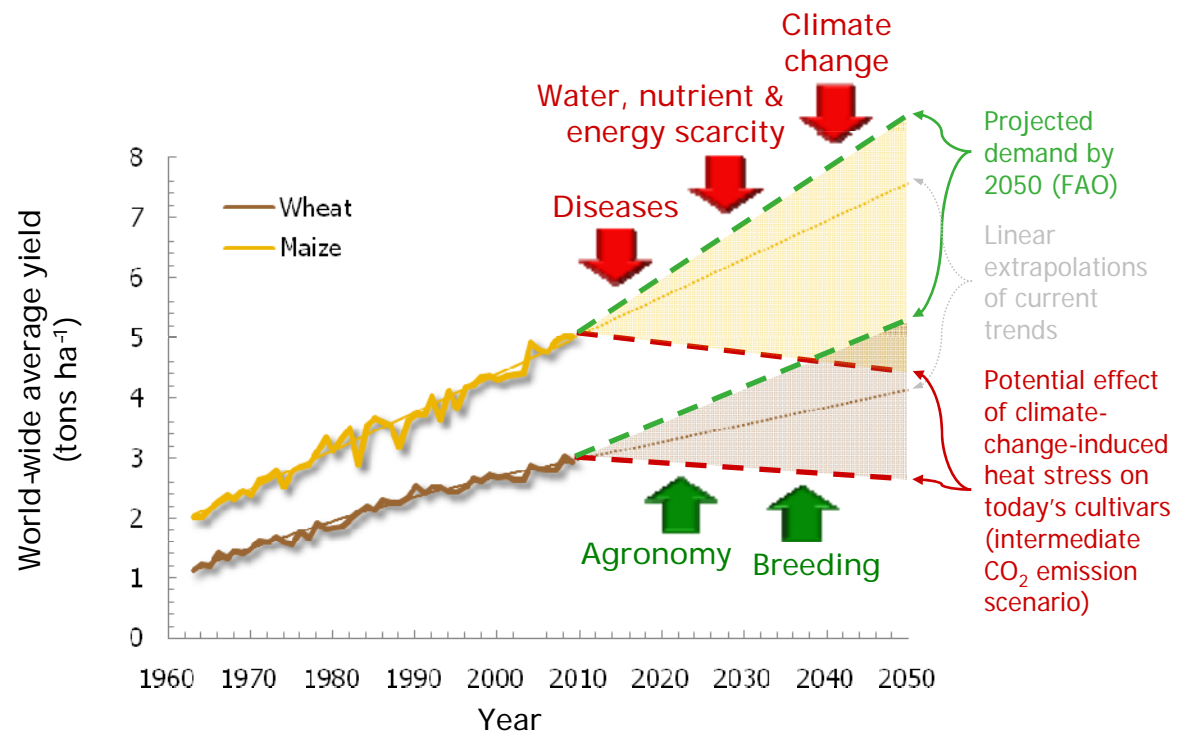


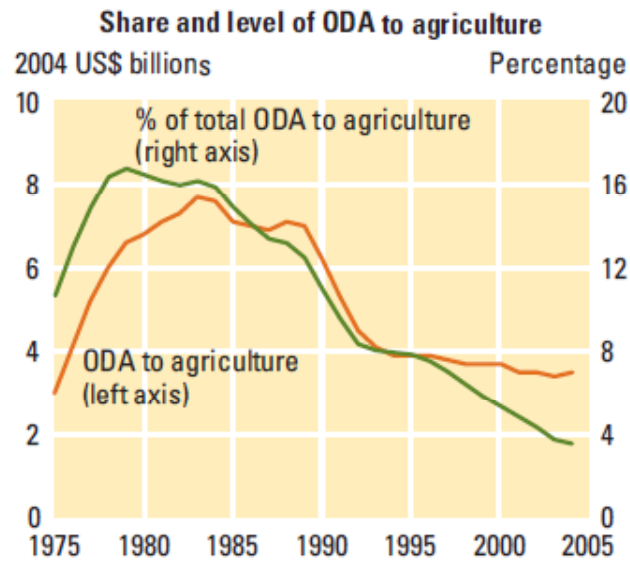
Wheat Blast – a new potential threat to global wheat production

Challenges summarized: For food prices to remain constant, annual yield gains would have to increase

- From 1.2% to 1.7% for maize
- From 0.8% to 1.2% for rice
- From 1.1% to 1.7% for wheat
- On essentially the same land area, with less water, nutrients, fossil fuel, labor and as climates change

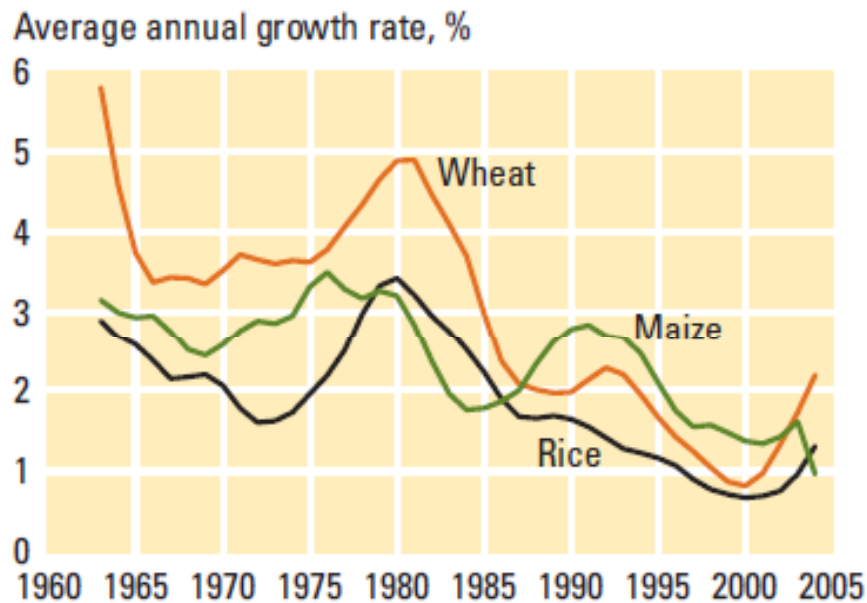
- First concerns: late 1990s
- The more we delay investments, the steeper the challenge
- Food riots and social unrest call us to FINALLY act!





Source: OECD 2006a.

Note: Data smoothed by locally weighted regressions.



Source: FAO 2006a.

Note: Data smoothed by locally weighted regressions.

**Stagnating
investments in
agricultural R&D**

**Stagnating yield
growth**

Source: WDR 2008

Grand Challenge to WHEAT

- *To dramatically boost farm-level wheat productivity, while renewing and fortifying the crop's resistance to globally important diseases and pests, enhancing its adaptation to warmer climates, and reducing its water, fertilizer, labor and fuel requirements.*



Ten-point action agenda for WHEAT

“Strategic Initiatives”

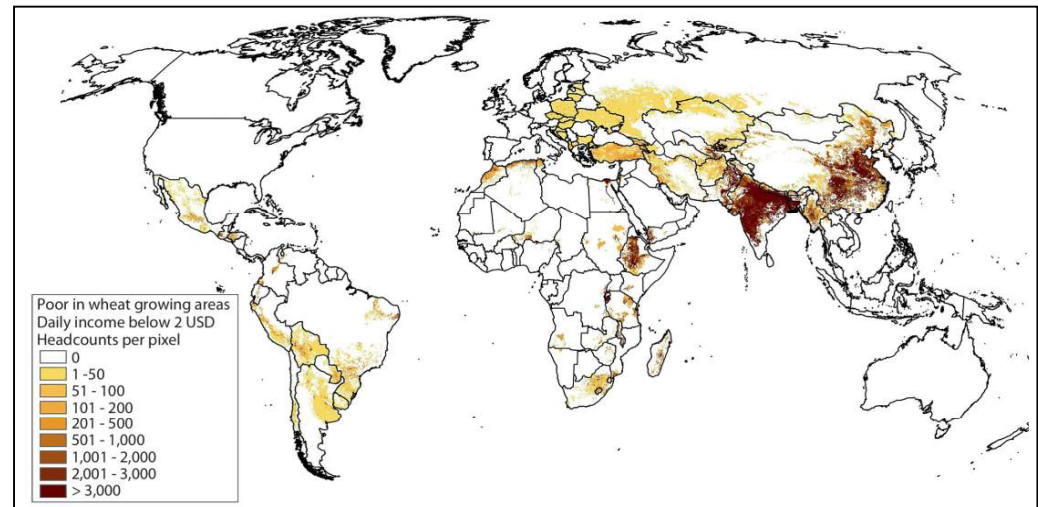
1. Technology targeting for greatest impact
2. Sustainable wheat-based systems
3. Nutrient- and water-use efficiency
4. Productive wheat varieties
5. Durable disease and pest resistance
6. Enhanced heat and drought tolerance
7. Breaking the yield barrier
8. More and better seed
9. Seeds of discovery – tackling the black box of genetic resources
10. Strengthening capacities



Targeting

Focus

- “Where wheat is grown in the developing world, it is eaten.”
- Complementary to middle- and high-income country investments in national wheat research

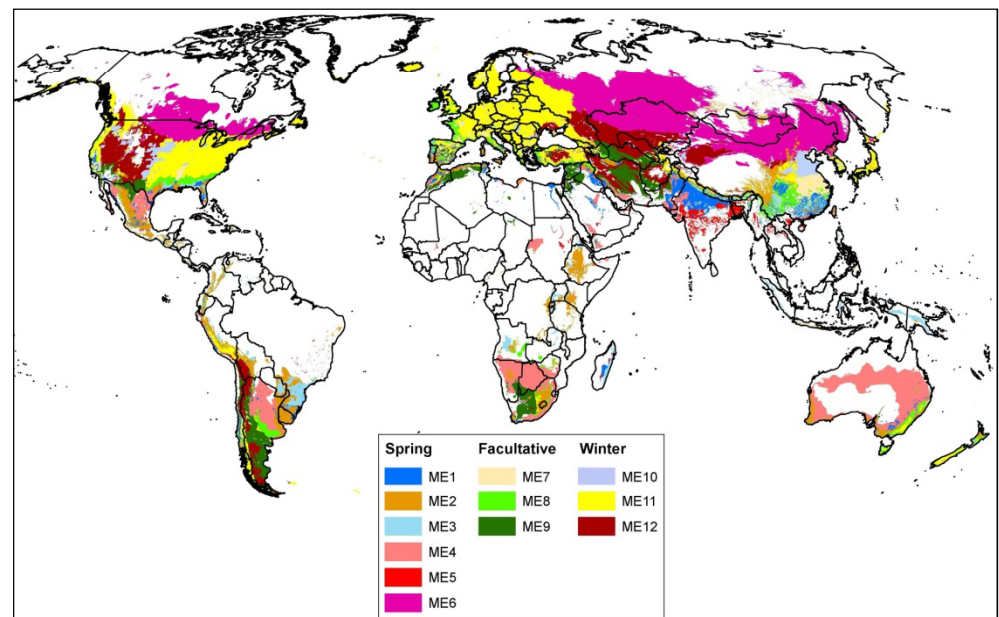


Total

- 2.5 billion poor wheat consumers, 1.2 billion “wheat dependent” poor

Estimated reach:

- **ME1, ME2, ME4, ME5:** 67% of the total wheat area, 84% of all wheat-dependent poor – **highest priority**
- **ME6, ME7, ME9, ME10, ME12:** 15% of all wheat-dependent poor



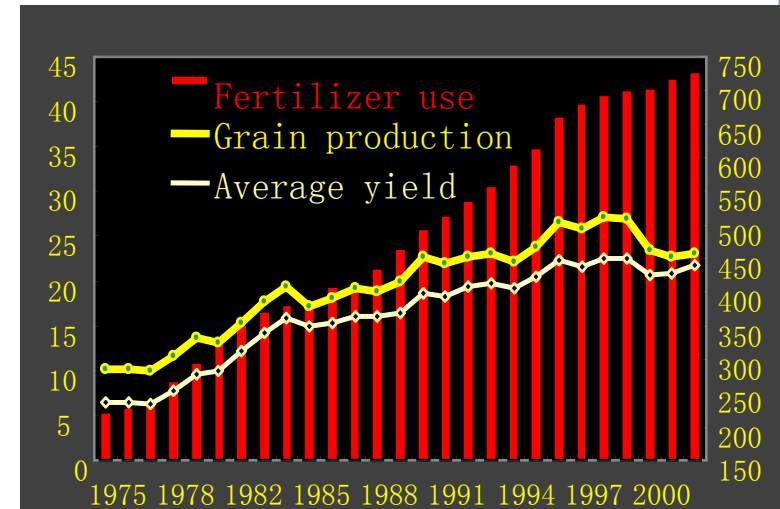
SI3 – Increasing the Use Efficiency of Vital Inputs: Nitrogen, Phosphorus, and Water

Issue

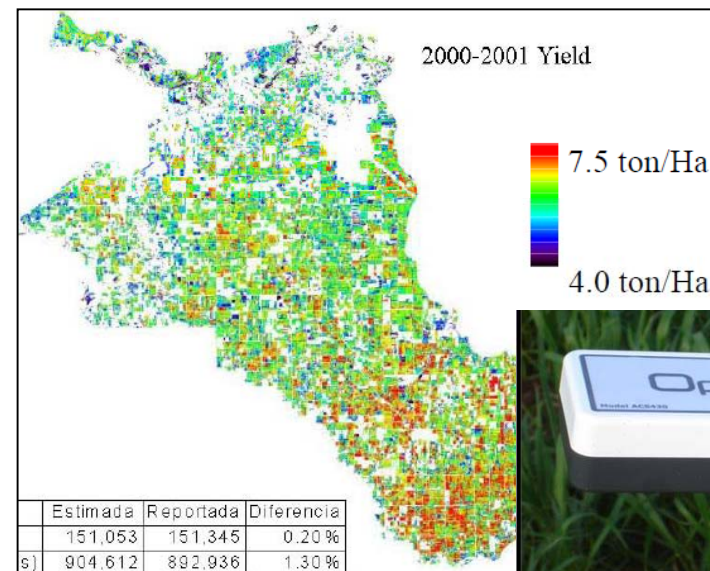
- Under-investment in agronomy begins to haunt us
- Low fertilizer use efficiencies in China and India.

Approaches and Outputs

- Precision agriculture approaches for smallholder farmers using optical sensors; satellite imagery; crop/soil simulation models; weather forecasting.
- Develop and refine ways to apply nutrients and water more efficiently
- Use sensing and cell phone technology to receive/get information from/to smallholders



Grain production and fertilizer use in China (m tons)



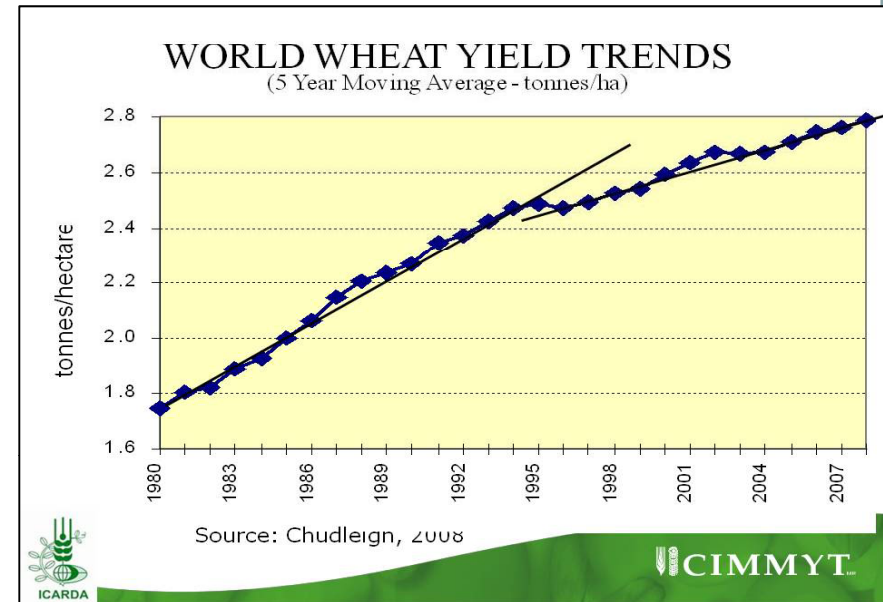
SI7 – Wheat Yield Consortium

Collaborators

- The CGIAR working with a consortium of mostly self-funded ARI and private sector partners from Argentina, Australia, Chile, Europe, Mexico and the US.

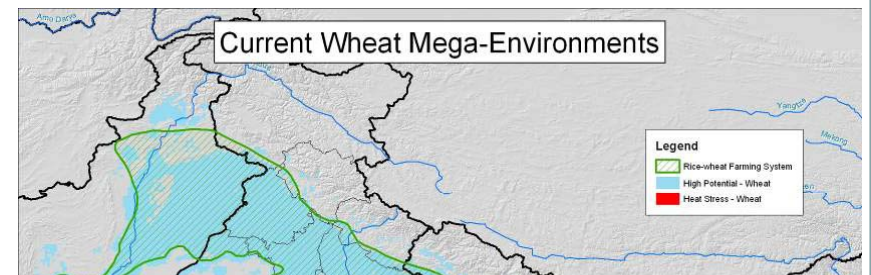
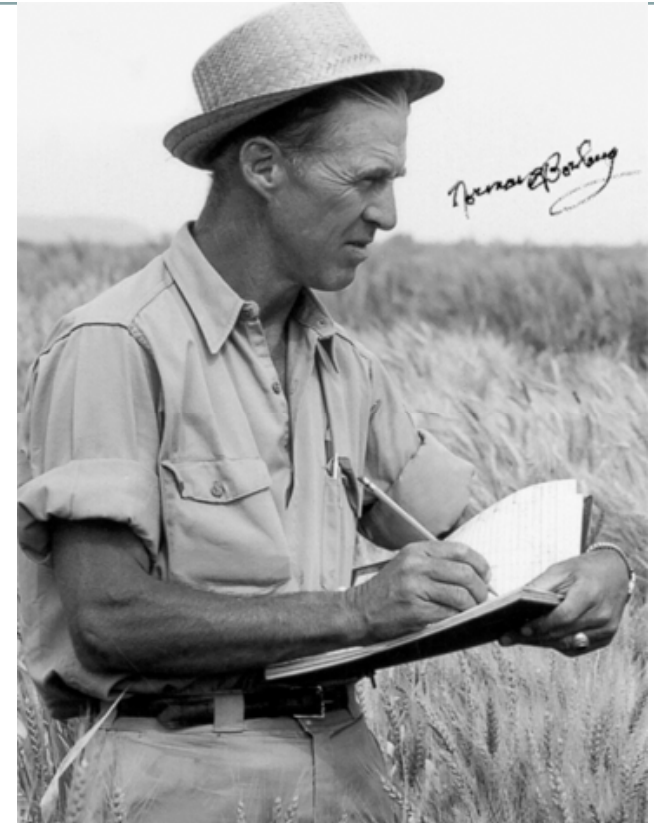
Approaches

- Wide-crosses + trait- based breeding + transgenics
- Rubisco optimization, reduced photorespiration
- Increased sink demand
- Increased stalk strength, reduced lodging
- Hybrids: conventional and transgenics



Borlaug Institute for South Asia (BISA)

- Joint initiative with the Government of India
- Co-location of CGIAR scientists and South Asian scientists **for de-novo research on the tremendous food security challenges facing South Asia**
- Heat tolerant wheat
- Practices to increase WUE, NUE, labor, fuel efficiency
- Support to cereal systems work
- Capacity building
- Status: Submitted for cabinet approval



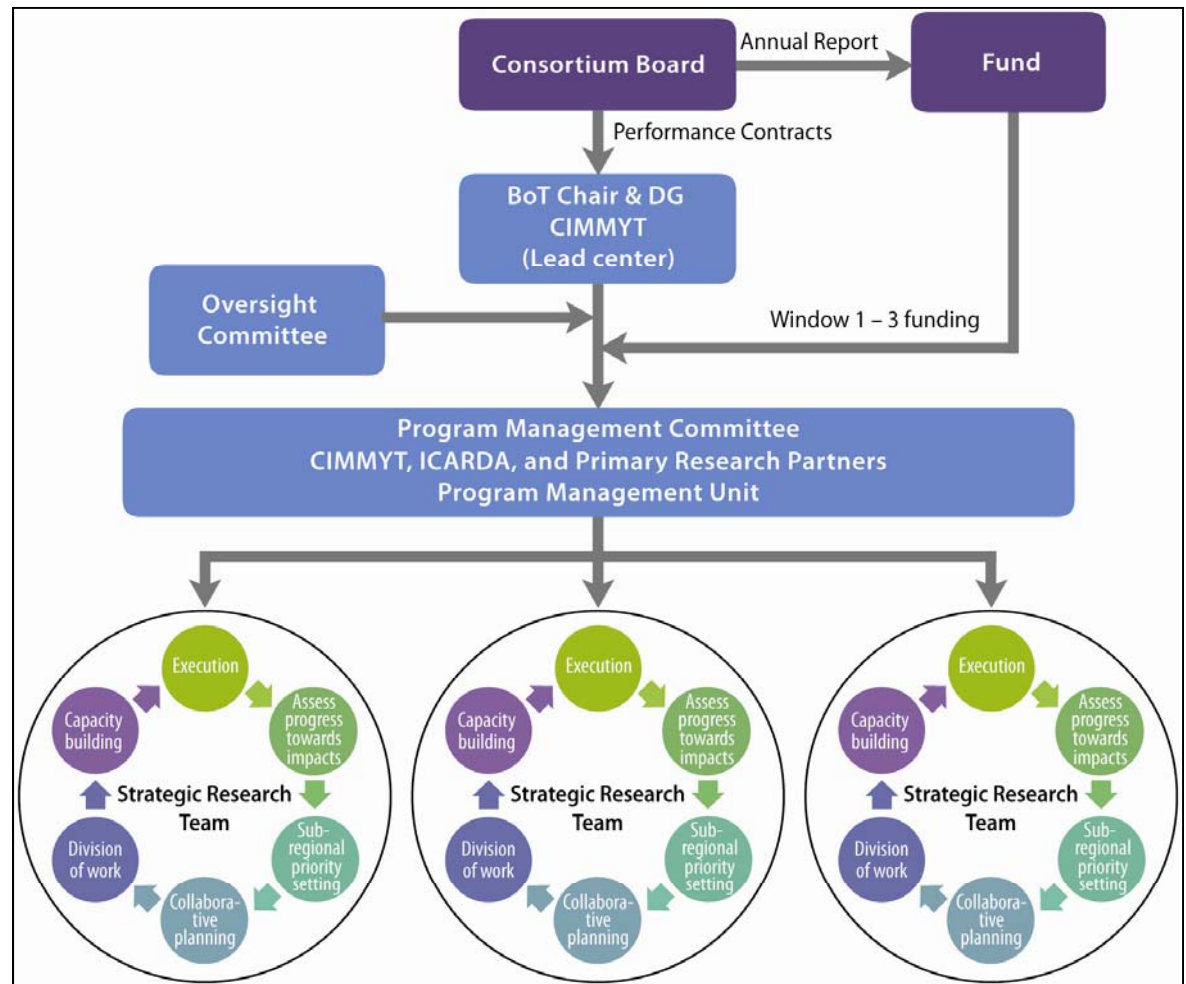
1 billion people = 1/7 of the world population affected



Management

Primary research partners:

- Indian Council for Agricultural Research
 - BBRSC, England
 - GRDC, Australia
-
- SI focused management
 - SI focused scientific expertise



Costs and Impacts of WHEAT

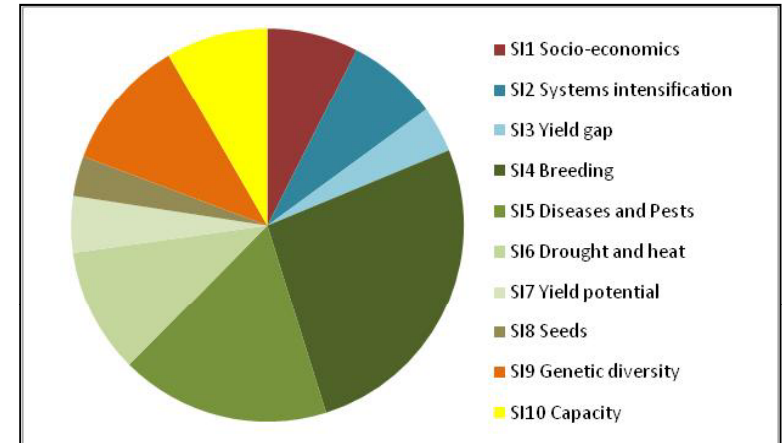
Operational funding:

CGIAR Window 1 & 2: USD 14.5 m (39%)

Bilateral funding: USD 39.8 m (61%)

Budget estimates: **58% of total funding needed**

Capital: BISA: costed separately



Benefit (*)	2020	2030
Productivity increase	3%	20%
Annual producer benefit	USD 1.3 billion	USD 8.1 billion
Farmers	3 - 5 million	30 - 40 million
Food (30% calories) for	60 million consumers	400 million consumers
Environment	Adaptation to climate change; increased biodiversity and soil productivity, reduced deforestation	

(*) Without impact from past research that is currently been deployed

Returns to investment – Wheat research, M&E

Study	Period covered	All breeding	Attributed to IWIN
Byerlee and Traxler (1996)	1966-90	\$3.0 b per year Internal rate of return of 53%	\$1.5 b per year
Heisey et al. (2002) mid-range estimate	1996-97	\$2.4 b per year	\$1.1 b per year
Lantican et al. (2005)--mid-range estimate	1988-2002	\$3.4-4.8 b per year	\$1.0 to 1.8 b per year
Marasas et al. (2004)--leaf rust resistance only	1973-2007		\$5.4 b net present value
Evenson and Rosegrant, 2002	1965-2000	With no breeding research: 9-14% reduction in output 29-61% increase in price	With no CGIAR 5-6% reduction in output 19-22% increase in price

Byerlee and Dubin, 2008

In real terms, current wheat budgets are at 45% of the budgets in 1980.

> 80 WHEAT CG scientists and many more partners feel accountable to the tremendous food security challenges of today's world

WHEAT-Global Alliance for
Improving Food Security and the Livelihoods of
the Resource-poor in the Developing World

Proposal submitted by CIMMYT and ICARDA
to the CGIAR Consortium Board



In collaboration with
Bioversity, ICRISAT, IPK, ILRI, IITA and WRI

55 National Agricultural Research Institutes • 15 Regional and International Organizations • 73 Universities and Advanced Research Institutes • 15 Private Sector Organizations • 14 Non-Governmental Organizations and Farmers Cooperatives • 20 Host Countries

4 March 2011

CIMMYT
International Maize and Wheat Improvement Center

ICARDA
International Center for Agricultural Research in the Dry Areas

BBC News - Report: Urgent action needed to avert global hunger

BBC Mobile News | Sport | Weather | Travel | TV

NEWS SCIENCE & ENVIRONMENT

Home | UK | Africa | Asia-Pac | Europe | Latin America | Mid-East | South Asia | US & Canada | Entertainment | Video

24 January 2011 Last updated at 11:32 GMT

Report: Urgent action needed to avert global hunger

By Pallab Ghosh

Science correspondent, BBC News

A UK government-commissioned study into food security has called for urgent action to avert global hunger.

The Foresight Report on Food and Farming Futures says the current system is unsustainable and will fail to end hunger unless radically redesigned.

It is the first study across a range of disciplines deemed to have put such fears on a firm analytical footing.

The report is the culmination of a two-year study, involving 400 experts from 35 countries.

According to the government's chief scientific adviser, Professor Sir John Beddington, the study provides compelling evidence for governments to act now.

The report emphasises changes to farming to



The report calls for an urgent change to food production in order to feed future generations