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Feeding the Future starts with Feeding the Present

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Progress and Commitment

- *Rates of hunger and poverty declining*
- *Agriculture-Nutrition linkages*
- *Stunting rates coming down, but still high*
- *Global Commitment in SDG 2*
- *Global Food Security Act signals US support*

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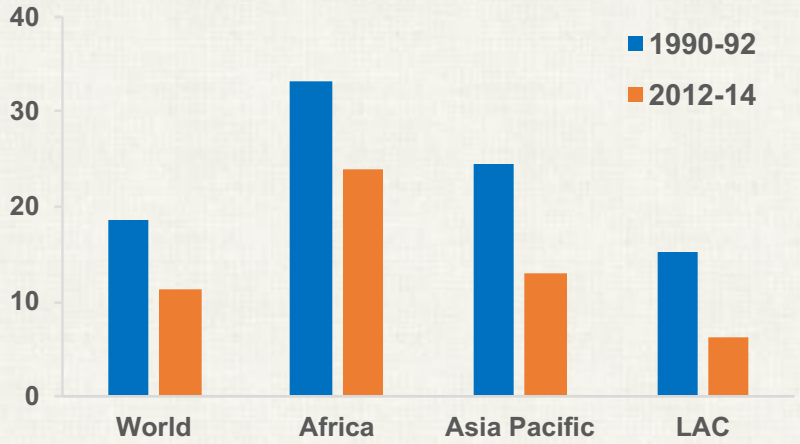
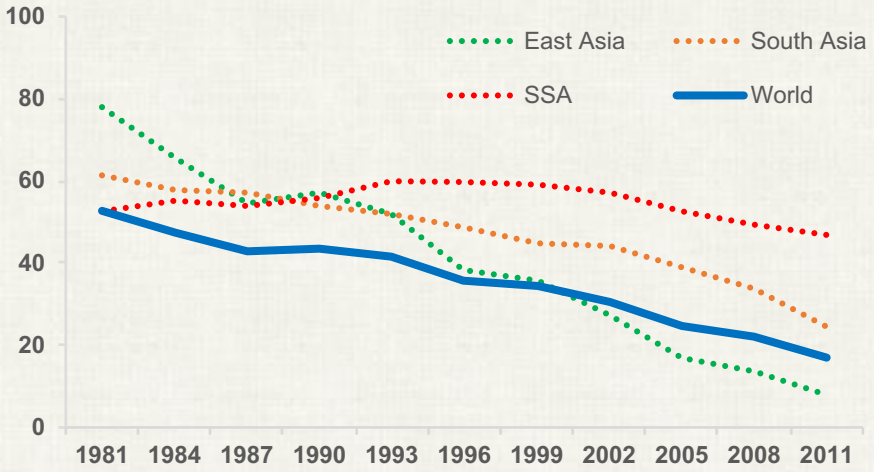
Poverty and hunger declining

Prevalence of undernourishment (%)



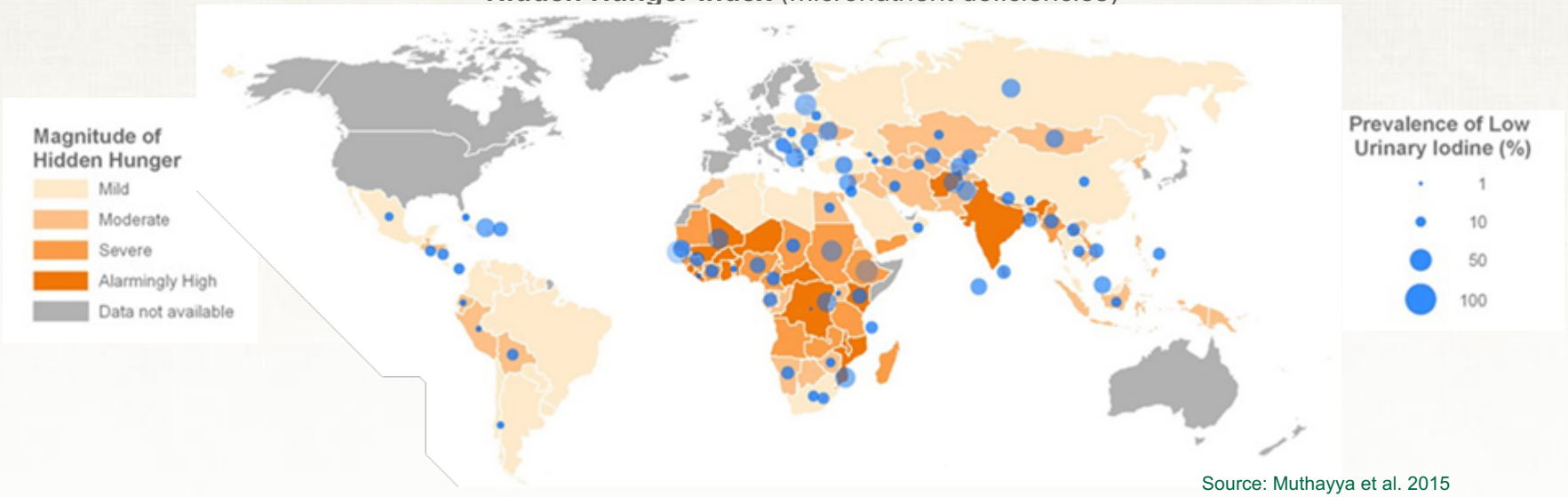
Source: FAO 2015

Prevalence of poverty (US $1.25/day, 2005 PPP), (%)



Source: PovCalNet 2015

Hidden Hunger Index (micronutrient deficiencies)



Source: Muthayya et al. 2015

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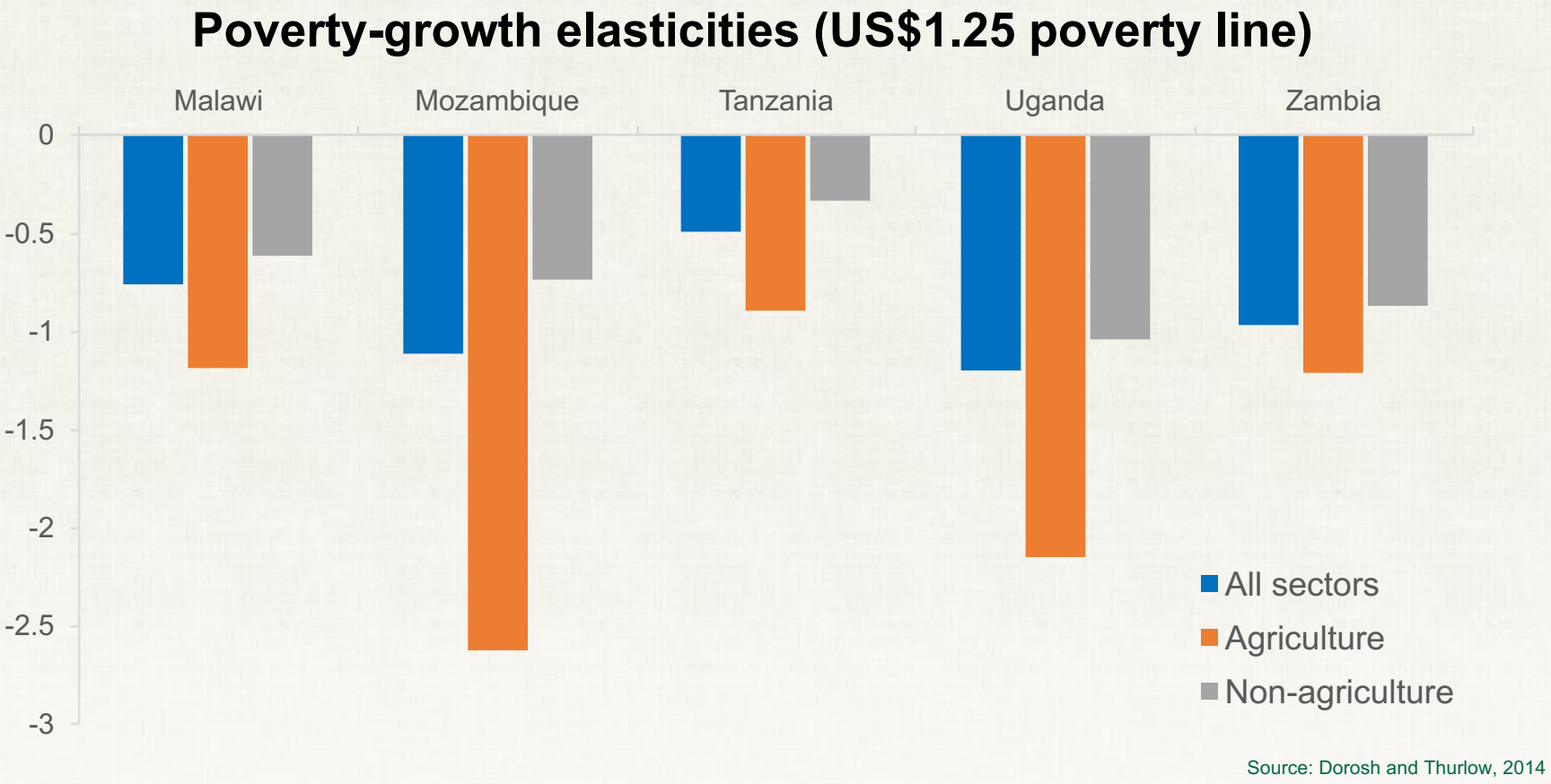
Agricultural growth is poverty-reducing



Source: Dorosh and Thurlow, 2014

Agricultural growth continues to be more poverty-reducing than non-agricultural growth

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Agricultural growth reduces hunger

- **Agricultural growth enhances hunger reduction**
  - Increases household incomes and diversifies diets
  - Reduces food prices to benefit poor net food buyers
  - Creates employment; stimulates rural nonfarm economy

- **Whether subsectoral growth reduces hunger depends on**
  - **Its linkages with rest of economy**
  - **Its initial size and geographic concentration**
  - **Its growth potential**
  - **Market opportunities**

Source: Fan and Brzeska 2012

Calorie deficiency-growth elasticities, Tanzania (2000-07)

Source: Pauw and Thurlow 2010

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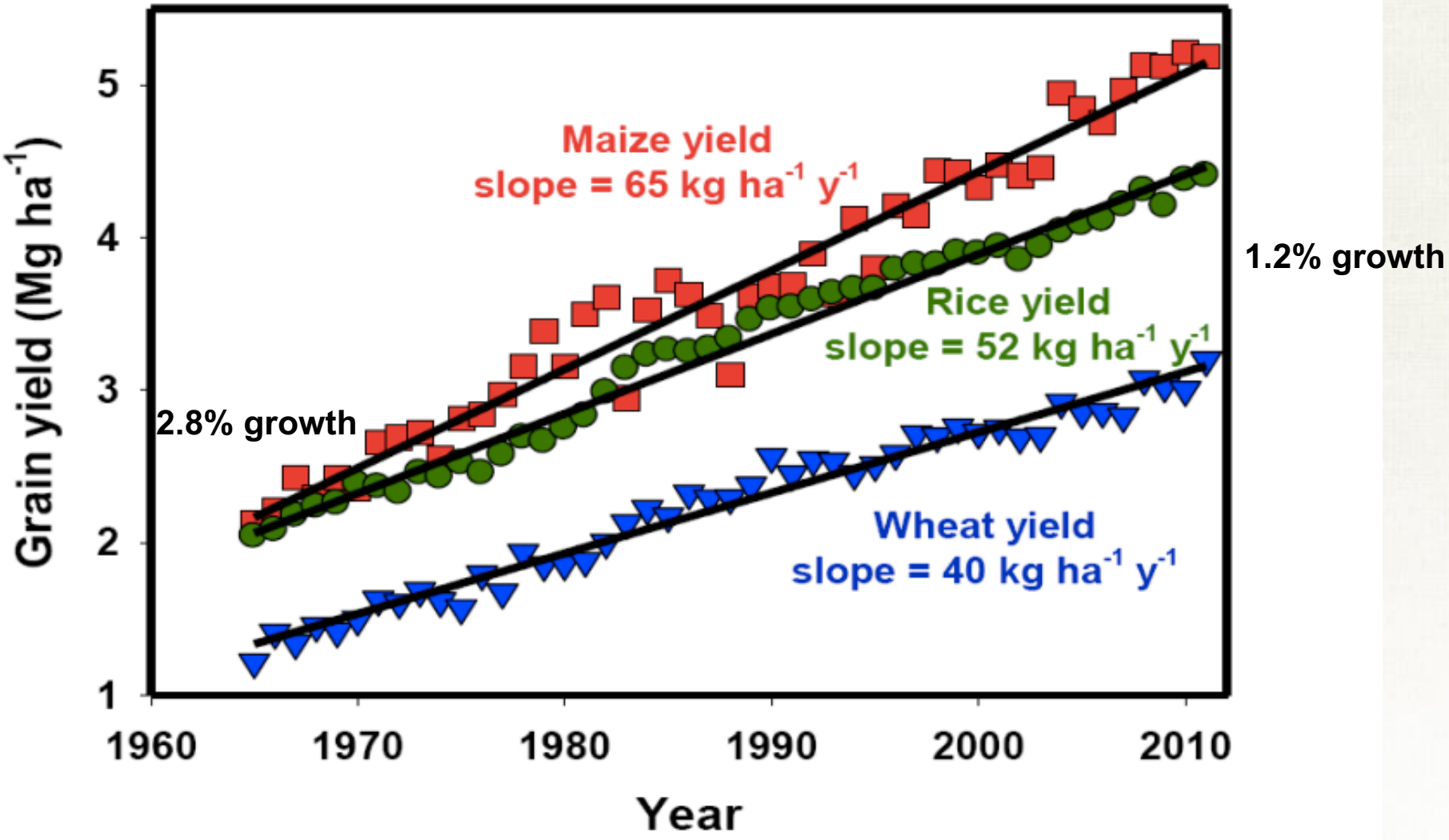
Despite progress—rate of gains slowing

Figure 1. Global yield trends in of the major cereal crops. Data from FAOSTAT, http://faostat.fao.org/site/339/default.aspx.



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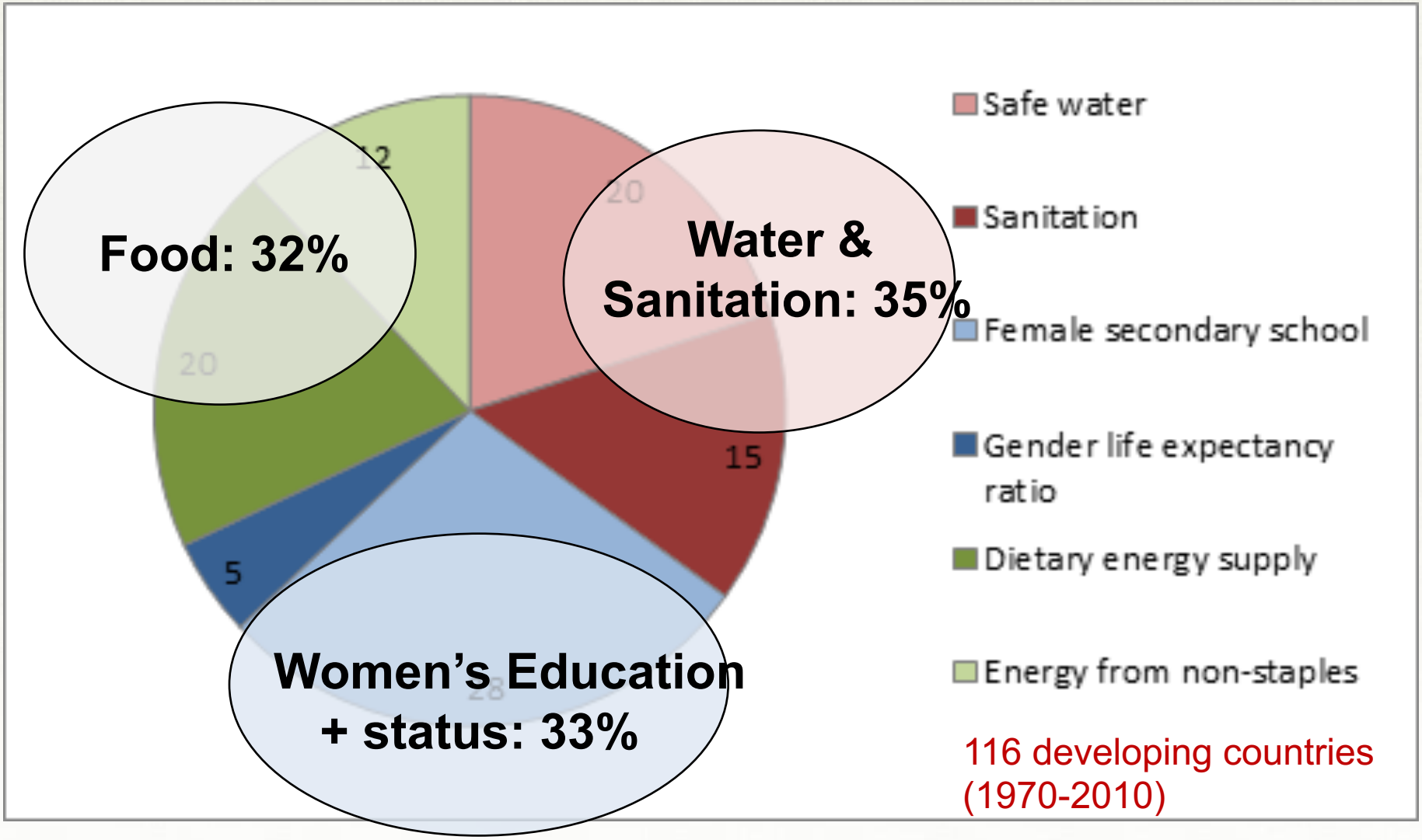
Contribution of Sectors to Improving Nutrition Globally



Source: Smith and Haddad, 2013

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Food Security Research Programs

3 Major Research Programs

Program anchoring research in key farming systems

Integrated Cross-Cutting Programs

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Cereals: Climate Resilient Research and Impacts

Heat Tolerant Maize in South Asia – CIMMYT, Purdue, NARS from India, Nepal, Bangladesh, Pakistan, Pioneer and 10 other seed companies

Heat tolerant hybrids released:

- More than 700 heat tolerant hybrids under testing
- 17 hybrids that outperform the best commercial varieties…achieved in 3 years!
- Unanticipated outcome: some varieties preferred by women farmers.

Drought-tolerant maize for Africa

- Redirection of plant "resources" toward ear development
- Variable/deeper root depth
- Shifting soil water uptake
- Shifting to earlier maturity (drought "avoidance")

Successful public-private partnership

- Private company partners increased from 3 to 11 in Asia, 160 hybrids released in Africa.

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Research on Legume Productivity

- bean, cowpea, chickpea, pigeonpea, groundnut , soy
  - Triple win:
    - Nutrition: protein and micronutrient-rich food
    - Poverty reduction: Source of income, esp. women
    - Environmental Sustainability: legumes fix nitrogen on farms – reducing need to purchase fertilizer
- Heat and drought **devastate** legumes
- Heat tolerant beans developed, Doubled-up legumes improve farm sustainability and profits

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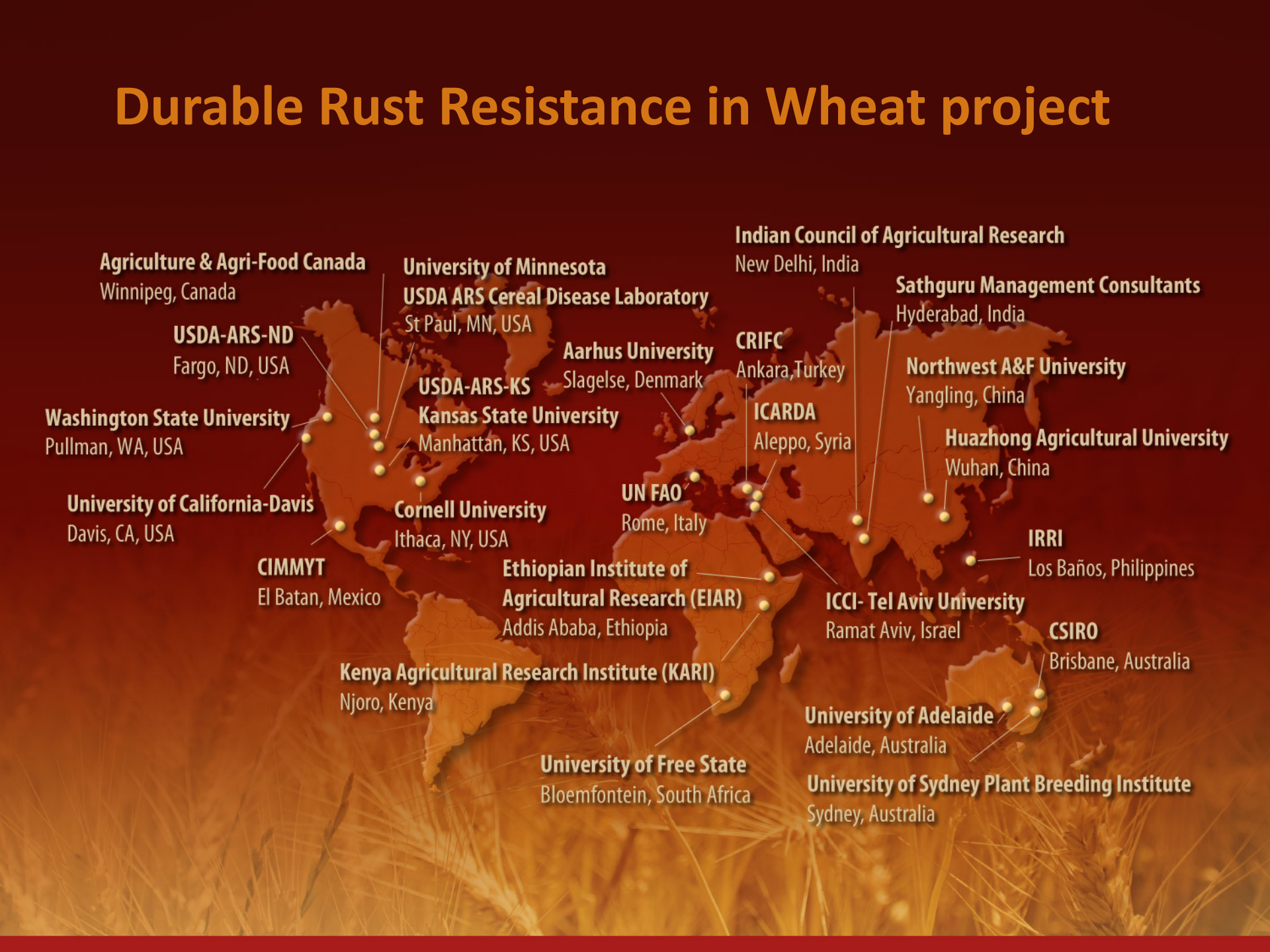
Advanced approaches to pests and diseases

Addressing infectious diseases in animals

- **Improve livestock management/feed**
- **Breed resistant animals**
  - New genomics tools
- **Develop vaccines**
  - Thermostable for improved transport

Durable Rust Resistance in Wheat project



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Some challenge defy traditional solutions

Image Credit: Agropedia

Fruit & Shoot Borer

Image Credit: RTB CRP

Cassava Brown Streak

Image Credit: AATF

Cowpea Pod Borer

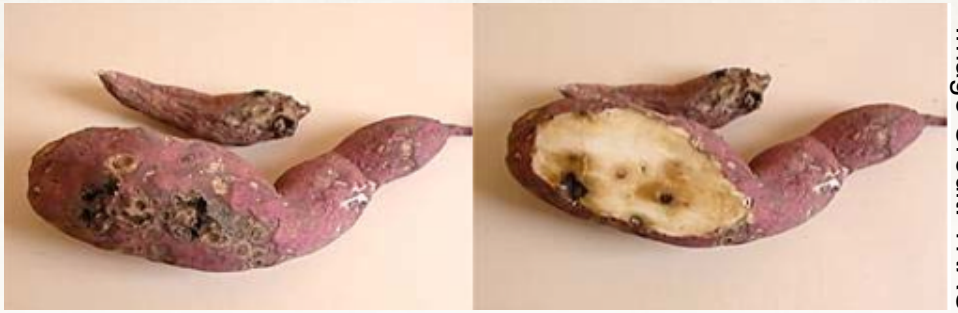

Image Credit: TNAU

Sweet Potato Weevil

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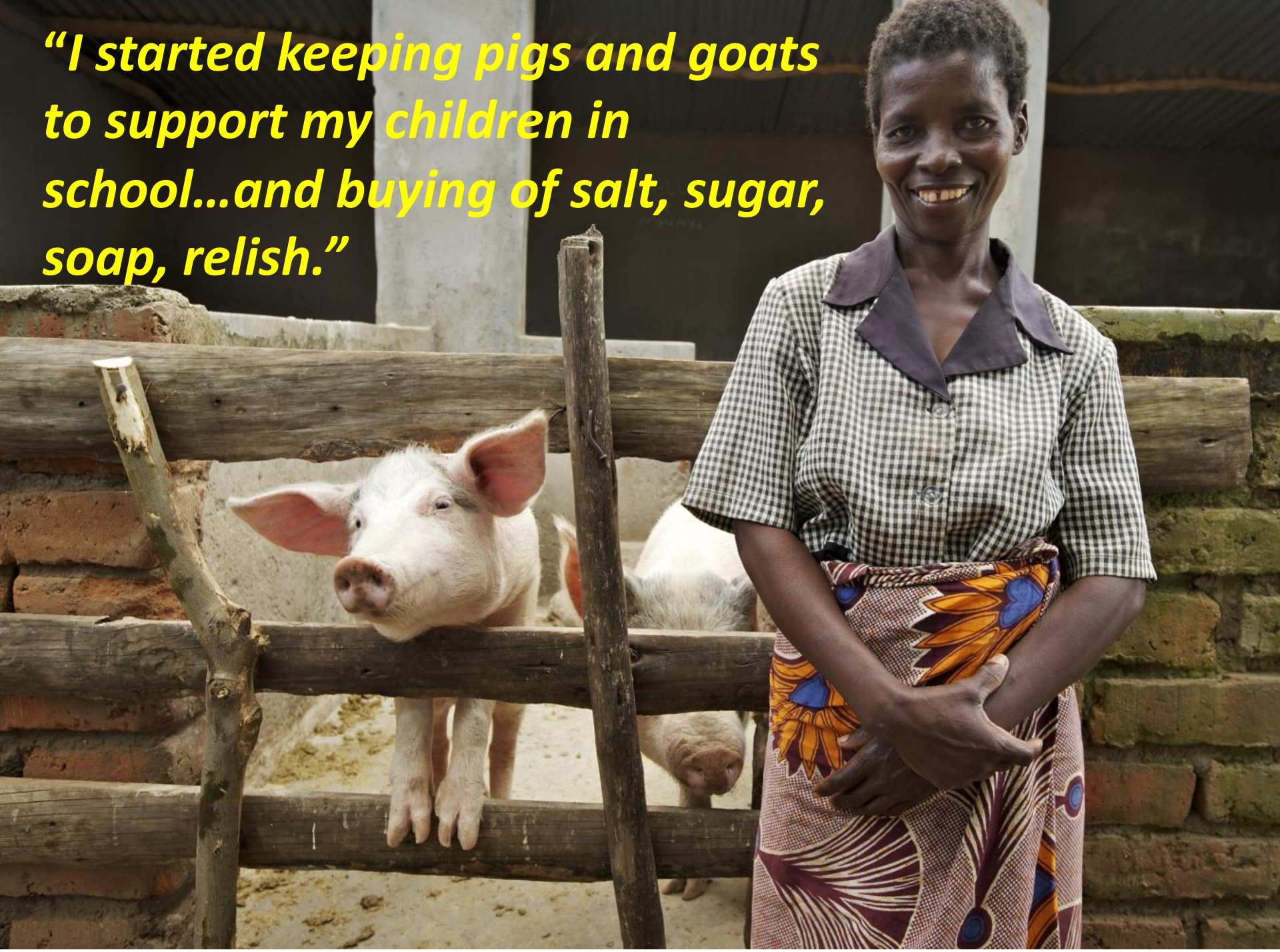
Research for Nutritious and Safe Foods

- Animal source foods, horticultural crops postharvest storage to reduce loss
- Research on identifying strategies to mitigate and reduce aflatoxin
- Improving diet quality and reducing food losses critical to achieving FTF nutrition goals
- Biofortification:Vitamin-A rich sweet potatoes in Uganda, iron-rich beans in Rwanda


Rhoda Mang'anya supports 7 people on ~1/2 ha.
Today she uses improved maize varieties and fertilizers, but only because of what else she does.


“I started keeping pigs and goats to support my children in school…and buying of salt, sugar, soap, relish.”

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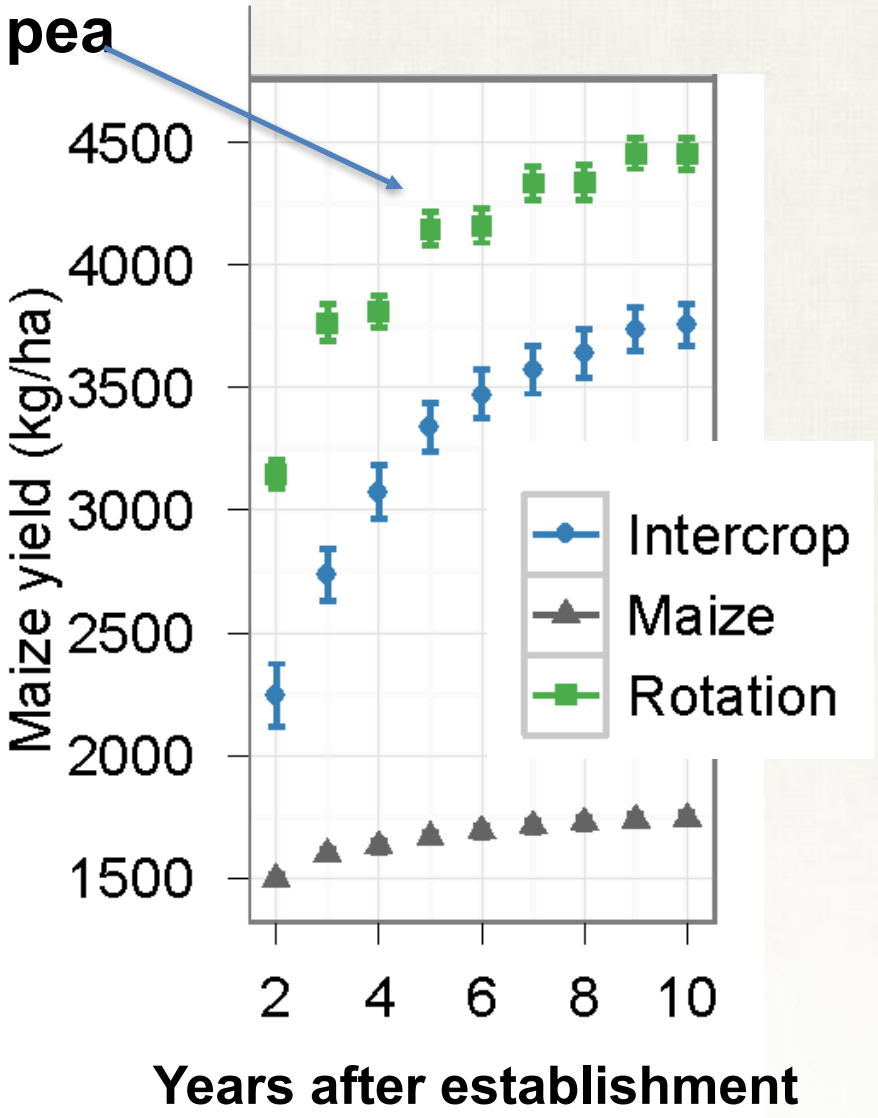
Climate smart: maize productivity, food security

Doubled-up pigeon pea rotation

Resilient legumes = more biomass = resilient soils = higher, more reliable yields

Ollenburger and Snapp, 2015



Sustainable Intensification

Key to Climate Smart Agriculture:

- Increased productivity per unit land, labor, capital—plus decreased emissions intensity
- Reduces risk, including climate risk
- Co-adaptation through biomass/org. matter
- Resource-use efficiency
- Efficient, prudent use of inputs
- Technologies—diverse and available
- Resource management practices
- Information/knowledge intensive

Envisioning the future: CA, diversification, + PA =

11% Crop Yield Increase

46% Energy Decrease

71% Irrigation Decrease

32% Profitability Increase

CSISA research platform @ CSSRI, Karnal, India

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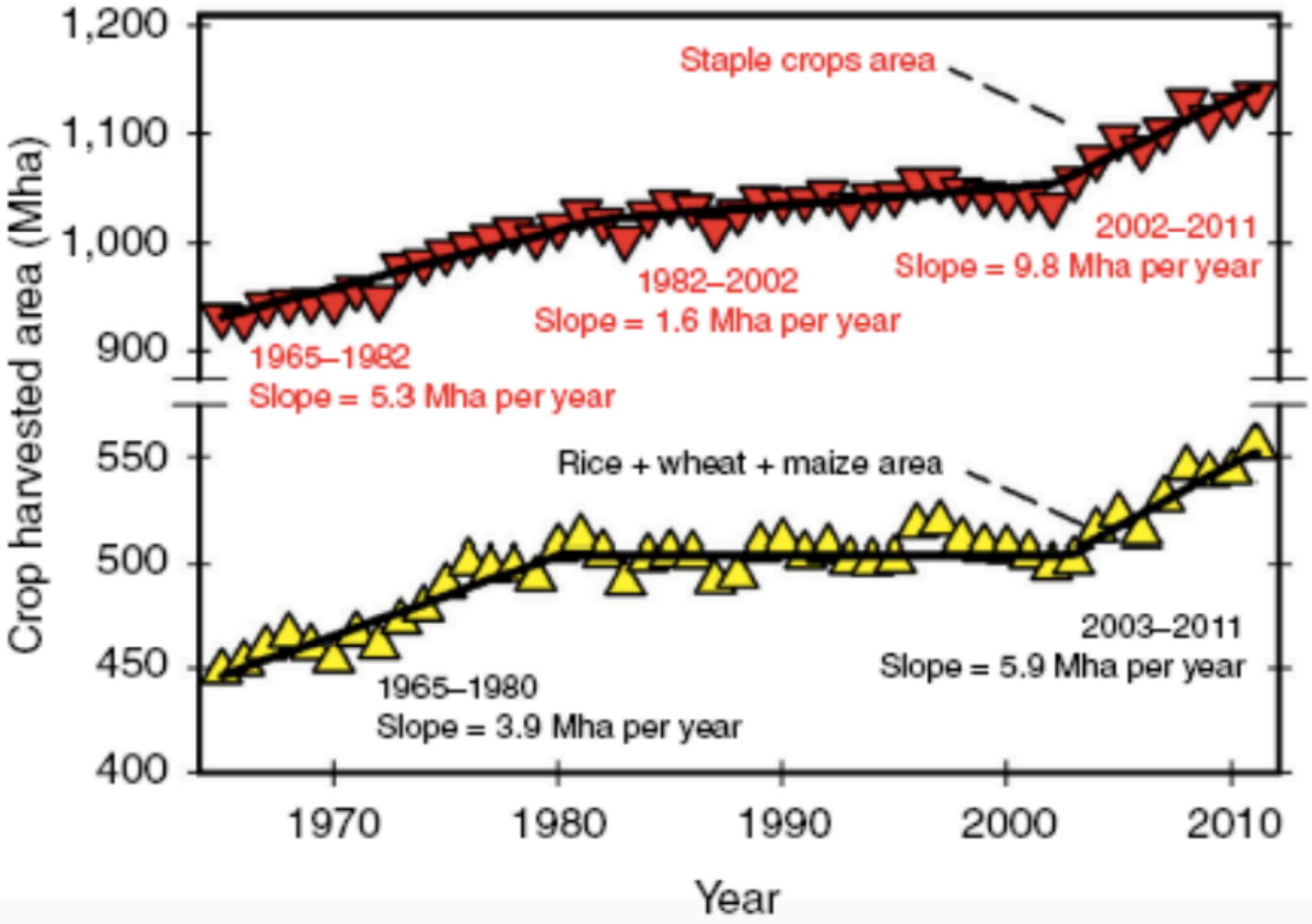
Global environmental goals depend on agriculture!

Figure 2. Trends in global harvested area from 1965 to 2011 for all staple food crops and for the three major cereals: maize, rice, and wheat. From: Grassini et al., 2013.



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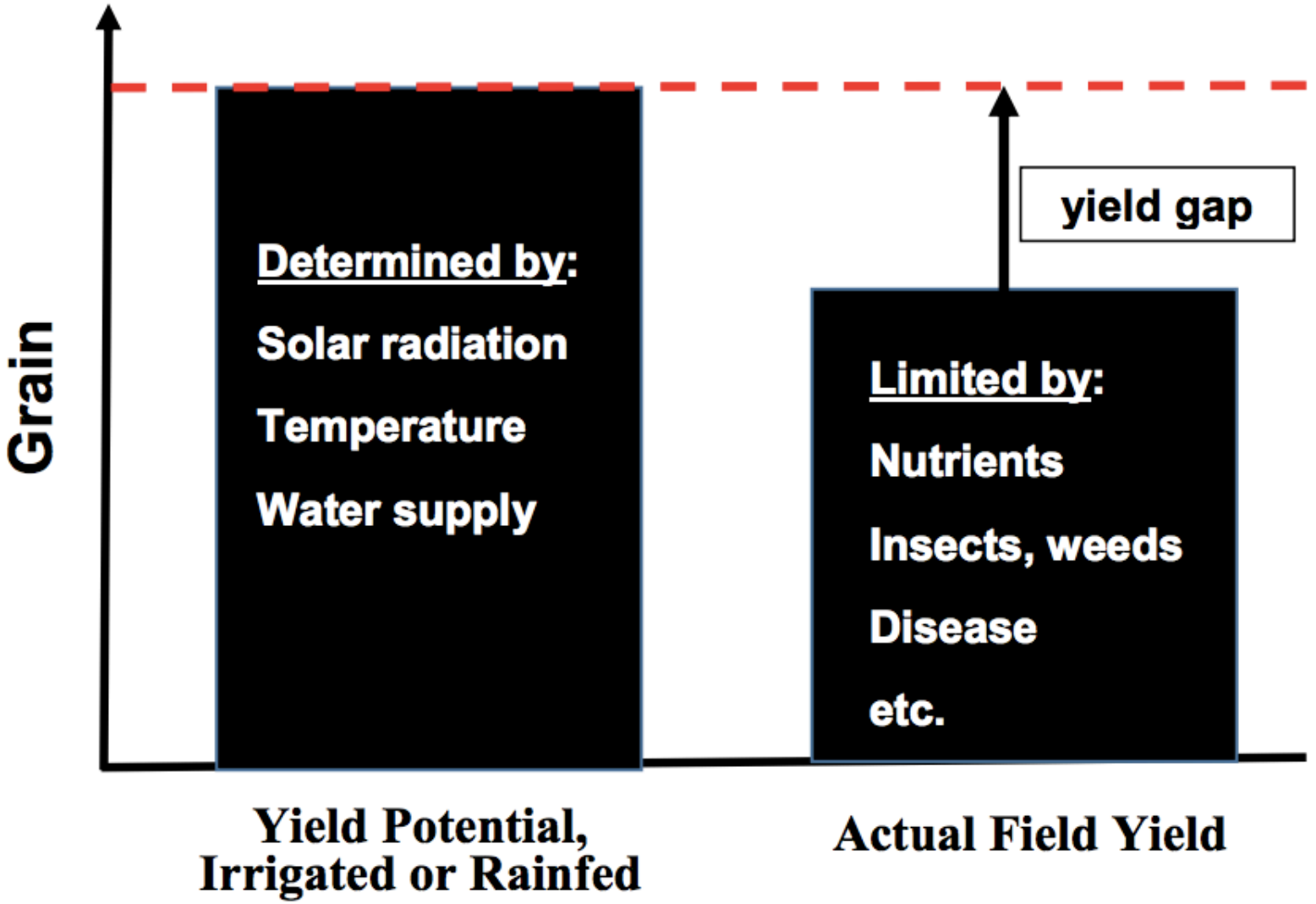
Closing the yield gap—using old and new tools

Figure 3. Yield potential, yield gaps, and their determining factors.



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Still needed: Irrigation, Mechanization, Fertilizer

Credit: Documentation Center of Cambodia (DC-Cam) /Makara Ouch

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What should we "select" for?

Feeding the Future

Photo: Borlaug Foundation

- ✓ Leverage new science for climate resilient crops and livestock
- ✓ Reduce yield gaps strategically
- ✓ Choices/info for farmers (seeds, weather, prices, advisory services)
- ✓ Resource-use efficiency
- ✓ Diversification –staple crop productivity link
- ✓ Policies, infrastructure enable capitalization and market access
- ✓ Measure gains-drive investment