Climate-Smart Agriculture in Asia
Feeding 9 Million People

Food Production by Region 1972-2050
(Constant 2004-06 US$)

Food Demand By Commodities in 2050 relative to 2005-07
(Billion kg per year)

CEA 2013 based on FAO 2012
Sadler, M. 2015. The Role of Resilient Supply Chains in the Face of Climate Change
IN KEY WAYS, THE NEXT 20 YEARS ARE ALREADY DETERMINED

Consumption will increase with prosperity.

Climate change: GHG now in the atmosphere will drive changes up to 2030.

Population increase: An extra billion people by 2025.

Urbanization: 2010 first year urban population exceeds rural population ~55% 2025.
CLIMATE CHANGE: WHAT CAN WE EXPECT?

- Less reliable precipitation/seasonality
- Higher temperatures
- More Extreme events (drought, flood, storm)
- Cold possible
- Pests and Disease—new/emerging/rapid changes
- Nitrogen fixation effects
EVOLUTION OF CLIMATE SMART AGRICULTURE

• Launch of Alliance at UNGA, Sept 2014
  – Many countries, World Bank, IFAD, FAO

• “Triple-win Concept”
  – Increased productivity and income
  – Increased adaptation
  – Reduced GHG footprint (mitigation)

• Implications:
  – Developed countries
  – Developing countries, especially smallholders
CLIMATE ALREADY CHALLENGING FOR SMALLHOLDER FARMERS


Ganges basin India, Limpopo basin Southern Africa

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:
• 700+ heat tolerant hybrids under testing.

• 17 hybrids out perform the best commercial varieties—achieved in three years!

• Unanticipated outcome: some varieties preferred by women farmers.
CEREALS: CLIMATE RESILIENT RESEARCH AND IMPACTS

Successful public-private partnership

- Private company partners increased from 3 to 11 in Asia, 160 hybrids released in Africa.
STRESS TOLERANT MAIZE DURING EL NIÑO

Murewa, Zimbabwe

Peter Setimela
PROGRAM FOR RESEARCH ON LEGUME PRODUCTIVITY

- Soy, groundnut, bean, mungbean, chickpea, pigeonpea, lentil, perennial shrubs
  - Outstanding attributes:
    - Nutrition: protein and mineral-rich food/feed
    - 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, role in systems
SUSTAINABLE INTENSIFICATION RESEARCH PROGRAM

• The challenge is to achieve sustainable transformation via smallholder farmers
• Existing and future technologies are essential
• Farmer choice—seeds, fertilizer, breeds
• Context for technology scale-up is crucial
• Integration of multiple technologies is needed
• Information—weather, market, extension
• Reduce risk—catalyze investment at all levels
LEGUMES: PRODUCTIVITY AND SUSTAINABILITY GAINS

- Sole maize + recommended fertilizer
- Doubled-up pigeon pea rotation + ½ fertilizer

Improves water-use efficiency too!

Maize yield

Profit

Protein yield

Ground cover

Sole maize = 100%
Fertilizer efficiency

LEGUMES: PRODUCTIVITY AND SUSTAINABILITY GAINS

Improves water-use efficiency too!
ENVISIONING THE FUTURE: CA, DIVERSIFICATION, + PA =

11% Crop Yield Increase

71% Irrigation Decrease

46% Energy Decrease

32% Profitability Increase

Photo: CSISA research platform at CSSRI, Karnal, India.
THE NITROGEN FERTILIZER PROBLEM

Overuse and Uneven Availability

CSA & SUSTAINABLE INTENSIFICATION

Needs to be Climate-Smart

- Increased productivity: land, labor, capital, decreased emissions intensity
- Reduced risk, including climate risk
- Co-adaptation through biomass/organic matter
- Resource-use efficiency
- Efficient, prudent use of inputs
- Technologies—diverse and available
- Resource management practices
- Information/knowledge-intensive
INTENSIFICATION VS. EXTENSIFICATION

South Asia

sub-Saharan Africa
ENVIRONMENTAL GOALS DEPEND ON AG TRANSFORMATION!

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.
CSA SPANNING VALUE CHAINS

Major opportunities for CSA… and profit!

- Input market—resource use efficiency
- Irrigation innovation/efficiency
- Risk-spreading/service provision helps drive capitalization
- Post-harvest loss reduction
- Market efficiency—better information for farmers
- Drying/processing innovations
- Reduce post-harvest losses
- Streamline trade to reduce transit times
SMALLHOLDERS STILL NEED: IRRIGATION, MECHANIZATION

Photo: Documentation Center of Cambodia (DC-Cam) /Makara Ouch
WHAT SHOULD WE “SELECT” FOR?

Feeding the Future

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