Green Revolution 2.0

Addressing the persistent challenges of food and nutrition security

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We are on a new trajectory in global agriculture.

Unfinished business.

Unintended consequences.

New realities.

A Green Revolution 2.0 is needed. Already taking place.
ODA for agriculture: coming out of the lost decades?

Source: OECD QWIDS database
What is the Green Revolution 2.0?

- Reversing productivity stagnation and decline in Green Revolution areas
- Correcting unintended consequences
- Enhancing sustainable productivity growth in areas left behind

Investing in agriculture as the engine of growth

But the pattern of growth must be *inclusive* and *sustainable*
Africa is ready for a GR

- Demand for intensification is rising
  - Classic drivers are present: population growth, urbanization, income growth and related dietary shifts
  - And the land/labor ratios in some areas are similar to those in Asia during the GR

- Important advances in appropriate technologies for Africa
  - Investment in “orphan crops” (e.g. sorghum, millets, cassava)
  - Targeting African agro-ecologies and environmental constraints (e.g. drought tolerance)

Sources: Alene et al 2011, ASTI; Fuglie 2011
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Africa is ready for a GR


Source: HarvestChoice (2011)
Adoption of improved varieties is increasing

Estimate of modern variety adoption

Change in adoption of improved varieties 1997-2010

Sources: Alene et al 2011
And the productivity gains are apparent

Agricultural Total Factor Productivity in Sub-Saharan Africa, 1961-2008

Source: Fuglie 2011
Asia's Agricultural Renaissance:

**Demand Side Drivers:**
- Increasing incomes, dietary diversification
- Rising demand for feed & biofuels

**Supply Side Drivers:**
- New technologies
- Growing private sector investments
- Renewed focus on marginal environments

**Rice area and yield, 1960-2010**

Source: FAO 2010
Overcoming the limitations of GR 1.0

- Poverty Reduction
- Nutrition security
- Marginal lands
- Environmental sustainability
Poverty remains pervasive

Despite the economic growth, 825 million Asians still live on less than $1.25 per day

Increasing Concentration of Poverty

Growth must be *inclusive*

- **Low income countries focus:**
  - Staple crop productivity
  - Market growth
  - Appropriate policies & institutional capacity

- **Emerging economies focus:**
  - Integrating smallholders into value chains
  - Closing the rural-urban income gap

Inclusive growth refers both to the *pace and pattern* of growth

- Strong focus on *economic* growth as a necessary condition for poverty reduction
- *Long-term perspective*, concerned with *sustenance* of growth
  - Broad based, across sectors
  - Include a *large part* of the country’s *labor force*
- *Emphasis on productive employment*, not redistribution of income
- Aligned with the absolute definition of pro-poor growth
- Fuelled by market-driven sources with government providing a *facilitating function*

Opportunities for smallholders in the Supermarket Revolution

Rising GDP per capita is associated with a larger share of supermarkets in food retail

Smallholders are taking advantage of new opportunities

Dairy

Hybrid feed maize

Fruits and vegetables
Income growth is necessary but not sufficient to ensure nutrition

- Rates of decline in undernourished are stagnating
- Micronutrient malnutrition persists
- Overnutrition becoming a simultaneous burden

Source: Wiesmann, 2007
We can do better on hunger and nutrition

- Improving staple crop productivity for income growth, increased energy and protein consumption
- Enhancing access to micro-nutrient rich foods
- Improving supply responsiveness of vegetables, legumes and other non-staples


Biofortification

HarvestPlus

- High iron beans & pearl millet
- High vitamin A cassava, maize, sweet potato
- High zinc rice & wheat

Orange-fleshed sweet potatoes

- High vitamin A sweet potato for sub-Saharan Africa
Access to GM technologies:
The contrasting tales of golden rice and bt cotton

Source: Potrykus 2010; Gruere 2012; Choudhary & Guar 2010; ISAAA

January 8, 2014
Feminization of agriculture can have direct nutritional benefits

The case of India illustrates a trend taking place across many countries:

- **Women are becoming the face of the smallholder farmer**
  - Women make up 32%-56% of the agricultural labor force on average in India

- **Family nutrition is benefitting**
  - Women are more likely to spend income they control on food, healthcare and education

- **Women are turning agriculture into good business**
  - India is rife with examples:
    - Dairy cooperatives
    - Village producers’ organizations
    - Digital Green
Dealing with marginal lands

Marginal environments are the new frontier:

- Spillover benefits from favorable environments (e.g. hybrid rice)
- New opportunities for feed, fuel & fiber production (e.g. adoption of hybrid maize)
Adoption of improved technologies is spilling over into lagging regions

Adoption of BT cotton varieties of Kanzara village, Akola district, India (2006-2007)

<table>
<thead>
<tr>
<th>Farm size Group</th>
<th>Number of Cotton growers</th>
<th>Total area Under cotton (ac)</th>
<th>Number of farmers adopted BT cotton</th>
<th>Area under BT cotton (ac)</th>
<th>% of farmers adopted BT cotton</th>
<th>% Area adopted under BT Cotton</th>
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<tbody>
<tr>
<td>Small</td>
<td>21</td>
<td>71.00</td>
<td>08</td>
<td>12.75</td>
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<td>18</td>
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<tr>
<td>Medium</td>
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<td>90.55</td>
<td>11</td>
<td>37.40</td>
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<td>9</td>
<td>142.50</td>
<td>08</td>
<td>83.00</td>
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<tr>
<td>Total</td>
<td>44</td>
<td>304.05</td>
<td>27</td>
<td>133.15</td>
<td>61</td>
<td>44</td>
</tr>
</tbody>
</table>

And farmers are responding

Cropping Pattern in Village Dynamics Study areas, Eastern India

Source: ICRISAT, Village Dynamics Survey (VDS)
Dealing with marginal lands

Marginal environments are the new frontier:

- Spillover benefits from favorable environments (e.g. hybrid rice)
- New opportunities for feed, fuel & fiber production (e.g. adoption of hybrid maize)
- Targeted research on crops & traits that are important to the poor (e.g. sorghum, stress tolerance)
Sustainable intensification

- Sustaining productivity gains
- Dealing with unintended consequences
- Understanding tropical and subtropical agroecologies
- Correcting policy distortions

The case of pesticide use in Indonesia

- Major effort in the 1980s to introduce integrated pest management
- Pesticide subsidies were removed in the early 1990s
- Insecticide use dropped dramatically

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Sustainable intensification
The Evolving R&D Architecture

- Rapid innovation in genomics and digital technologies producing new breakthroughs (e.g. Beijing Genomics Institute)
- The private sector dominates global agricultural R&D spending

Global Private Agricultural Input R&D (constant 2000 US$, millions)

Sources: Fuglie 2009; Carl Pray et al, Private R&D in Agriculture in South Asia (forthcoming)
India exemplifies the shifting pattern of Ag R&D investment

Source: Carl Pray et al, Private R&D in Agriculture in South Asia (forthcoming)
Implications for public institutions?

There is still a role to play, but focus needed on:

- Market failures, particularly crops and traits that are important to the poor
- Local adaptation of technologies

Source: Alene et al 2011; ASTI
Conclusions: Public Policy for GR 2.0

- Agriculture as an engine of growth, and pursuit of inclusive growth (reaching smallholders, lagging regions)
- Enhance competitiveness in the modernizing agricultural systems, in particular supply responsiveness for fresh produce
- Create incentives for sustainable use of natural resources
- Optimize food policy for nutrition, especially access to micro-nutrient dense foods and changes in maternal and child feeding habits
- R&D for (global) public goods:
  - Crops and traits important to the poor
  - Marginal environments
  - Technology adaptation for smallholder context
Thank You